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OF  
GREAT BRITAIN AND IRELAND.

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APRIL 10TH, 1877.

JOHN EVANS, Esq., F.R.S., *President, in the Chair.*

The minutes of the previous meeting were read and confirmed.

The following presents were announced, and thanks were ordered to be returned to the respective donors for the same.

FOR THE LIBRARY.

From the SOCIETY.—Proceedings of the Royal Society. Vol. XXV, No. 178.

From the EDITOR.—Matériaux pour l'Histoire de l'Homme, February, 1877.

From the ACADEMY.—Bulletin de l'Académie Impériale des Sciences de St. Petersbourg. Tome XXIII, No. 2, 4to.

From the AUTHOR.—Brochs and the Rude Stone Monuments of the Orkney Islands, By Dr. James Fergusson.

From the ASSOCIATION.—Transactions of the Social Science Association, Liverpool, 1876.

From the Royal Academy of Sciences, Amsterdam.—Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen, Tweede reeks Deel X; Jaarboek, 1875; Procès-Verbaal, 1875-6.

From the EDITOR.—Revue Scientifique. Nos. 40 and 41, 1877.

From the EDITOR.—Nature (to date).

The President exhibited two stone adzes from Burmah.

Captain Dillon exhibited flint arrow heads from Oxfordshire.

The President and Colonel Lane Fox remarked on the above exhibitions.

The following paper was read by the author.

VOL. VII.

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## ON SOME RUDE STONE MONUMENTS IN NORTH WALES.

By A. L. LEWIS, M.A.I.

LAST summer, during a stay of a few days in North Wales, I was enabled to visit some of the rude stone monuments with which the country abounds, and to observe the following particulars concerning them :—

In the park of Plás Newydd, so beautifully situated on the Anglesea shore of the Menai Straits, stands a dolmen, pictures of which are perhaps more numerous than of any other rude stone monument, Stonehenge and Kit's Coty House possibly excepted. It has often been called a Druidic altar, but it is obviously a sepulchral dolmen, and was doubtless covered with earth or stones in part or entirely. It consists of two chambers in a line running about N.E. and S.W., but not communicating with each other. The larger is at the north-east end, and has six upright stones still in position, two others being prostrate; its dimensions are about 9 feet by 8 by  $4\frac{1}{2}$  high, the extreme measurements of the covering stone being 12 feet by 10 by  $4\frac{1}{2}$  thick. The smaller chamber is about 6 feet by 4 by  $2\frac{1}{2}$  high, and is covered by a stone 6 feet square by  $1\frac{1}{2}$  thick; four of its supporters remain upright, and one is fallen, while a few fragments lie round about, which probably formed part of the walls of the chambers. The total length of the dolmen is about 24 feet; some of the stones are of a slaty nature, in consequence of which two have split beneath the weight of the covering stones. At a little distance in a north north-westerly direction is a pentagonal flat-topped stone, 5 feet high and 8 feet in thickness, which might possibly have served as an altar, but which has no apparent connection with the dolmen.

On about the middle of the top of the Great Orme's Head is a tumulus, from 30 to 40 feet in diameter, and 10 or 12 feet high, at the southern edge of which stands a little dolmen, consisting of four upright stones, forming a pentagonal chamber, about 5 feet across and 4 high, the side to the south-east being open. This chamber is only partly covered by a capstone 4 to 5 feet in diameter and not more than one foot thick, and in its present appearance and dimensions is singularly like some of the Antas of Portugal, described and figured by M. Pereira da Costa, but it may be only part of a larger structure. Its most peculiar feature is its position, not in, nor upon, but by the side of a tumulus. It is not improbable that it may have been used like the Indian dolmens recently described by Mr. Walhouse, and which it seems to me to resemble, as a kind of shrine or covering for small objects of a sacred character. In this case its position by a probably sepulchral tumulus might indicate

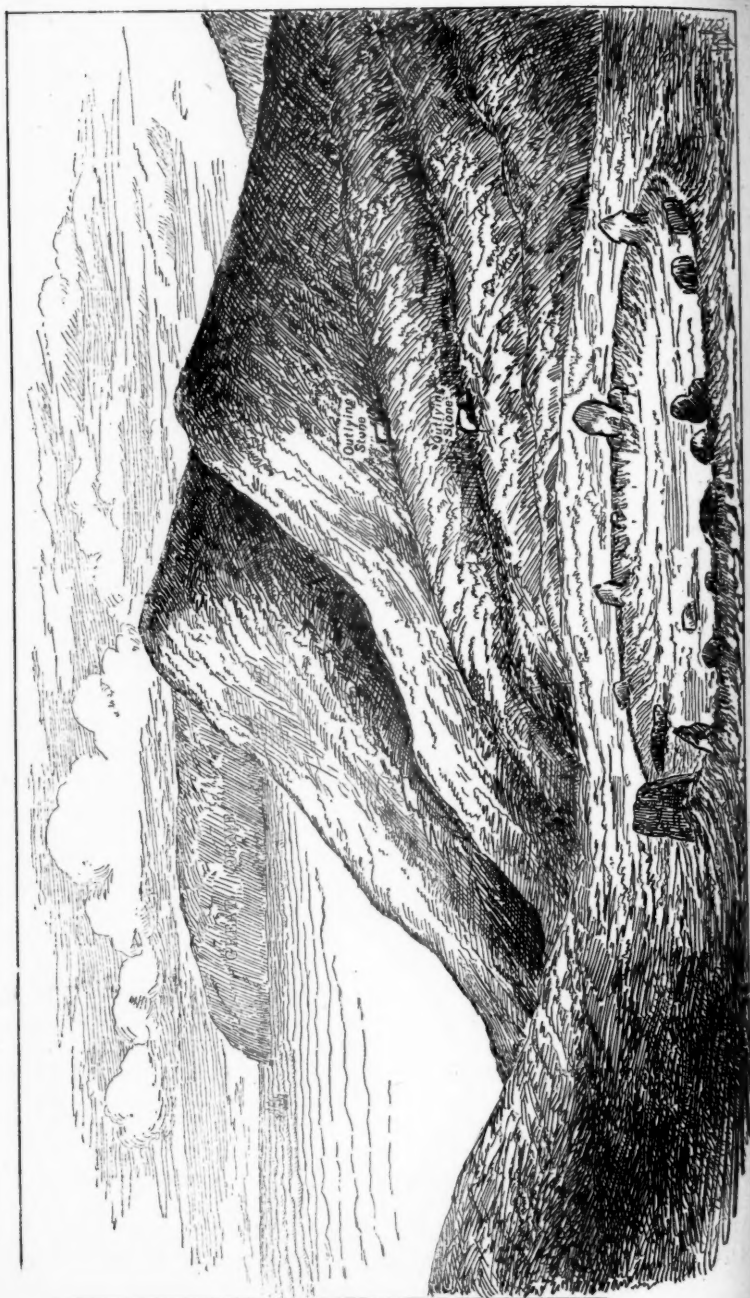
that it was a sort of memorial chapel. According to Stukeley, Kit's Coty House stood at the end of a long barrow, of which no trace now remains; but this dolmen is much more like a sepulchral chamber than Kit's Coty House, which in my opinion never differed materially from its present condition.

The third monument of the kind which I visited, is situated at Tyn-y-coed farm, Capel Garmon (above Bettws-y-coed), and differs from the two I have already described. It consists of three chambers, in a line nearly east and west, and communicating with each other. The western and central chambers are about 10 feet long, and the eastern  $8\frac{1}{2}$ ; the width varies from  $5\frac{1}{2}$  to  $8\frac{1}{2}$  feet, and the height is about 5 feet,  $3\frac{1}{2}$  of which are below the present surface of the surrounding tumulus. The western chamber is constructed of large, thin, slaty slabs, and is covered by a similar stone, 14 feet by 11, and not more than one foot thick. The other chambers are not now covered, but have preserved in them much more of the small, loose, flat stone work with which the spaces between the larger stones were carefully filled up. The north-east corner of the central compartment is cut off by two stones, and forms a little chamber by itself, and from the southern side of the central compartment a passage, some six yards long by one wide, runs to the outer edge of the tumulus. This passage is constructed, like the chambers, of slabs mingled with small uncemented masonry, and, as it narrows towards the top, the walls may have been continued upward till they met, at a height of 4 or 5 feet. This passage may remind us of the "portals," described by Dr. Lubach in connection with the "Hunebedden" of Holland, being, like them, at the south side of, and at right angles to the chamber to which it conducts. Perhaps if it were carefully explored with the spade it might disclose some few relics of the builders. The remains of the tumulus are now surrounded by an uncemented stone wall, which did not, however, appear to me to be part of the original structure.

At Aber, by the side of the road to the waterfall, is a single stone, 5 feet high by 3 by 2, in the middle of a circle, 18 feet in diameter, of small stones piled together and overgrown with vegetation. Looking nearly due south from this stone the beautiful fall of Aber is clearly visible, and looking in the opposite direction the sea appears between two hills, the stone being placed in the direct line between the two, but with regard to its antiquity and object I cannot say anything with certainty.

The last monument which I have to describe, is a circle called Y Meineu Hirion,\* on the Cerrig-y-Druidion, or hill of the Druids, next Penmaenmawr. I have not been able to ascertain

\* See wood-cut on page 120.





how long the name Cerrig-y-Druidion has been in use, but if it could be traced back for even three centuries it would go far to show that the association of the Druids with the rude stone monuments is not, as has been suggested, a mere invention of the antiquaries of the last century. Y Meineu Hirion is composed of a small low bank of earth and stones forming a circle 80 feet in diameter, on which stood some larger upright stones; of these seven now remain upright, their dimensions varying from 3 to 5½ feet in height, and from 1 to 5 feet in breadth and thickness, and one, 8 feet long, lies prostrate; there are also sundry fragments and stumps. This monument, described in Gough's Camden's Britannia as one of the most remarkable in North Wales, is not unlike the Roll-rich in character, but is smaller, and, so far as regards the circle itself, even insignificant. There is, however, one feature of very great importance, which is not noticed by Gough or Camden, but to which I will now call your attention. In my former papers on Rude Stone Monuments, I have dwelt often and at some length on the very frequent, if not entirely uniform, occurrence in connection with our British circles of a special reference to the north-east, either by single stones placed in that direction or otherwise, and on the probability, deducible from this circumstance in particular amongst others, that these circles were places of resort, or in other words, temples, for sun-worship; and I am glad to be able to say that this little circle of Meineu Hirion is no exception to this rule, but a rather curious exemplification of it. At Stonehenge and the Roll-rich, the outlying stones are so placed as to stand between the circle and the sun as he appears above the horizon on the morning of the longest day, but on the north-east of the circle of Meineu Hirion, the ground falls rapidly away into a deep hollow, on the other side of which are lofty hills, yet, 500 feet to the north-east, down in the valley, is a large stone, now prostrate, 9 feet long, by 5 by 2, and in the same direction, but about 400 feet further, is another prostrate stone, 9 feet long, by 5 by 4. It might be suggested that, as the sun would not light these stones up in rising on Midsummer Day, the solar theory would be at fault, but for the fact that they lead the eye directly to two hills on the other side of the valley, over the top of one of which, or more probably between the two, the sun would rise on the longest day; and, even were it not so, the reply would be obvious that customs often survive without strict regard to their original causes, and I think therefore that I am fully justified in claiming this case as a strong proof in support of what I have so frequently urged on former occasions.

About 250 feet in a north-westerly direction from this circle

is a collection of small stones, without form or probable use that I could discover, but which I presume is one of the smaller circles said to exist in the neighbourhood of Y Meineu Hirion.

## DISCUSSION.

Mr. MOGGRIDGE said: South Wales is especially rich in the so-called Druidic remains; and as far as my own experience of cromlechs goes, I can testify in support of what has been so well said by Col. Lane Fox, that, out of many that have been visited by me, not one presented any indication of having ever been covered by a mound. The cromlech and a small space around are sometimes included by a ditch; which would appear to negative the existence heretofore of a mound. It has been suggested that if ever that structure was covered, the earth may have been used as manure, but many of these cromlechs are on the wild mountain-top, and far away from any cultivation.

Mr. WALHOUSE observed: That the small cromlech placed at one end of the long tumulus much resembled the rude shrines noticed by him in Southern India, where a capstone supported by a back and two side-slabs covered a rough image or lingam stone. Supposing the tumulus represented in the model to be sepulchral, the cromlech, which appears never to have been covered over by earth, might have stood as a shrine or sacellum at its end. The model of a large composite cromlech, apparently half-sunken in the earth, reminded him of the great cromlechs in Guernsey, that on l'Ancrese Common and the one called l'Autel du Grand Sarazin, which were certainly originally subterranean and sepulchral. The other model exhibited by Mr. Lewis, a large tabular stone, supported by lumps rather than slabs, seemed very like some remarkable structures on a mountain-top in the province of Coory in South India, which strongly suggested devotional or sacrificial rather than sepulchral purposes, and showed no traces of interments or of having been ever covered by a mound.

Mr. LEWIS, in reply, said there were no doubt stone chambers that had never been intended to be covered, and there were probably others which had been left unfinished from some cause. He believed, in some parts of India, chambers were covered to the level of the capstone, leaving that stone itself exposed, and if such had been the case in Europe, those chambers which had been so slightly covered, would probably be the first to be denuded. The Plâs Newydd dolmen might have been such a one, but he had no doubt it was intended to be more or less covered, and the ground inside was still a foot lower than the park outside. The Tyn-y-coed dolmen was still buried half its height in a tumulus.

The President and Col. Lane Fox, and others, took part in the discussion.

Models constructed by the Author of the dolmens described by him were exhibited in illustration of the paper.

The following paper was then read by the Director:—

CURIOUS COINCIDENCES IN CELTIC AND MAORI VOCABULARY.

By REV. WM. ROSS, F.S.A.S., M.R.I.A.

It may be difficult to find a race that does not, or did not at some stage of its history, believe itself to be aboriginal, its language the primitive speech, and its people autochthones *αυτοχθόνες*. The more cultivated and literary of their chroniclers, historians, and scholars, have endeavoured to trace connexions and affinities between the tongues of their own people and those most highly esteemed, or generally regarded as of the highest antiquity. No language has in this respect, perhaps, a more curious literary history than the Celtic. David Malcolm of Duddington, thought that Hebrew, Syriac, Arabic, and Talmudico-Rabbinic were largely indebted to the Celtic for some of their distinguishing characteristics, and that this ancient tongue was fitted to throw light on their structure and idiom. That it was closely allied to the original language spoken on the Isthmus of Darien, he had little doubt of. Twenty-three words, most of them twisted into the most incongruous forms to suit his purpose, led him to this conclusion. One writer traced a connection with the Jaloffs in Africa, and another with the Leni-Lenappe of North America. Others maintained it was the parent tongue of Greek, Latin, Sanscrit, &c. Some maintain it is Aryan, and some as strongly assert it is not. I shall not now enter into that question, although I think Dr. Prichard's work as well as the labours of subsequent writers in the same direction has decided the question once for all.

The following curious coincidences in form and meaning between the Celtic and Maori, while not given as a proof of affinity in the ordinary acceptation of the term, are suggestive, as prompting inquiry in a different direction, a direction in which philologists have as yet done little, if we except some of the interesting papers read for several years by Dr. Hyde Clarke, one of the Secretaries of this Section.

Celtic.			Maori.
Cù, dog..	..	..	ku-ri, dog.
Duine, man	..	..	tane, a male.
Bean	} woman..	..	.. wahine, Venus.
Mna			
Iasg, fish	..	..	ika, fish.
Tri, three	..	..	toru, three.

Nasg, tie .. ..	nika, tie.
Geur, sharp .. ..	oro, sharpen.
Thig, come .. ..	tiki, to fetch.
Chi, see .. ..	kite, see.
Gairm, call .. ..	karanga, to call.
Seadh, yes .. ..	se, yes.
Cend, first .. ..	katahi, for the first time.
Cia, as, whence .. ..	kohea, whither.
Thinge, towards .. ..	whaka, in a direction to.
Agus, and .. ..	hoki, and also.
Ma, if .. ..	me, if.
Miann, desire .. ..	amene, desire.
Anmhuinn, weak .. ..	anewa, weak.
Eirich, to rise up .. ..	ara, to rise up.
Gradh, love .. ..	aroa, love.
Suiridh, to woo .. ..	arnaru, to woo.
Tuthadh, to thatch .. ..	ato, thatching.
Cabhaig, hurry .. ..	kaika, to be in a hurry.
Cach, remainder .. ..	kòha, remainder.
Cùb, to bend .. ..	kopi, to bend.
Coire, a kettle oven .. ..	kori, oven.
Gearradh, cutting .. ..	koripi, to cut.
Meanglan, branch .. ..	manga, branch of tree or river.
Teth, hot	} .. tahu, to set on fire.
Teothadh, warm	
Uth, udder .. ..	u, udder.
Rann, verse .. ..	raranga, verse.

The list might be very considerably extended. We know nothing of these words to connect them with Celtic. We do not know as yet their composition, roots, or history. They are coincidences worthy of at least being noted. Do they not suggest to us the possibility if not probability that many languages and families carry with them still some of the characteristics of a pre-historic and primeval speech, the common patrimony of the human race? They carry the form and feature, but the colour is different. So the language may still have much of a primitive character, while the exigencies of time, circumstances and relations have tended to mould, or modify words and expressions which originally own the same parentage.

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A report by Mr. A. Mackenzie, on the Australian Languages and Customs, forwarded to the Institute by Her Majesty's Colonial Office, was then read, by the Director, but its publication is unavoidably postponed, from press of matter, till the next Number of the *Journal*.

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APRIL 24TH, 1877.

JOHN EVANS, Esq., F.R.S., *President, in the Chair.*

The minutes of the previous meeting were read and confirmed.

The following presents were announced, and thanks were ordered to be returned to the respective donors of the same:—

FOR THE LIBRARY.

From the Academy.—Atti della R. Accademia dei Lincei, Vol. I, No. 4.

From the ASSOCIATION.—Journal of the East India Association. Vol. X, No. 2.

From the AUTHOR.—Sketch on the Origin and Progress of the United States' Geological and Geographical Survey of the Territories. By Prof. F. V. Hayden.

From the SOCIETY.—Bulletin de la Société d'Anthropologie de Paris. Vol. XI, No. 4.

From Prof. F. V. HAYDEN.—Bulletin of the United States Geological and Geographical Survey of the Territories. Vol. III, No. 1; Catalogue of Publications of ditto. Second edition.

From the EDITOR.—Revue Scientifique. Nos. 42 and 43, 1877.

From the EDITOR.—Nature, to date.

Dr. JOHN RAE read the following paper:—

ESKIMO MIGRATIONS.

In the month of March, 12 years ago, two papers were read before the Ethnological Society, in which very different views regarding the migrations of the Eskimos were expressed. In the one, conclusions were arrived at and deductions drawn from known facts, without calling in the aid of fancy. In the other, theory and imagination \* were the chief elements, supported by

\* Terms used by the author.

one or two facts of little or no value, towards verifying the writer's opinions, as I shall endeavour to point out.

Mr. Clements R. Markham, the author of the last-mentioned paper, upheld the idea that the Eskimos, called Arctic Highlanders, inhabiting the north-west part of Greenland, reached that place in almost a direct line *vid* the Parry Islands, from Siberia, without touching the American continent, as the following extracts will show.

See "Arctic Papers for Expedition of 1875," folio 167.

"The ruined yourts of Cape Chelagskoi (in Siberia) mark the commencement of a long march; the same ruined yourts again appear on the shores of the Parry Group. A wide space of 1,140 miles intervenes, which is as yet entirely unknown. If my theory be correct, it should be occupied either by a continent or by a chain of islands, for I do not believe that the wanderers attempted any navigation, or that they indeed possessed canoes at all. They kept moving on in search of better hunting and fishing grounds along unknown shores, and across frozen straits, and the march from the capes in Siberia to Melville Island, doubtless occupied more than one generation of wanderers.

"There is some evidence, both historical and geographical, that the *unknown tract* in question is occupied by land. A chief of the Tuski nation told Wrangell, that from the cliffs between Cape Chelagskoi and Cape North, snow-covered mountains might be descried at a great distance to the north. There are geographical reasons, which have been pointed out by Admiral Osborne, for the supposition that land, either as a continent or as a chain of islands, extends to the neighbourhood of the Parry group. The nature of the ice floes between the north coast of America, off the mouths of the Colville and Mackenzie and Bank's Lands, leads to a conclusion that the sea in which such ice is formed must be, with the exception of some narrow straits, land-locked.

"The ice is aground in 7 fathoms water, and the floes even at the outer edge, which are of course lighter than the rest, are 35 to 40 feet thick. The nature of the ice is the same along the west coast of Bank's Land. Such awful ice as this was never seen before in the arctic regions. The only way of accounting for its formation, which must have taken a long course of years, is that it has no sufficient outlet, and that it goes on accumulating from year to year. It must therefore be in a virtually *land-locked sea*, and this *of course* implies land to the north, as well as to the east, south and west.

"Here then is my bridge by which these people passed over



from the frozen tundra of Siberia to the no less inhospitable shores of Prince Patrick Land, to the head of Wellington Channel and Baffin's Bay, and far into the unknown region. The theory of Eskimo migration is thus illustrated by facts in physical geography!!"

Before going further, it may be asked where are these facts in physical geography which Mr. Markham mentions with so much confidence?

We have not a single fact, except it be the report of the Tuchi Chief to Wrangell, that land had been seen far to the north of Siberia, which at the utmost stretch of the imagination could not be much more than 100 miles distant, or only one-twelfth of the distance separating Siberia from the Parry Islands.

With regard to Admiral Osborne's views as to the great accumulation of large masses of ice on the west and north-west of the Parry Islands being caused by the sea being land-locked, no evidence could be more unfortunately chosen to prove Mr. Markham's theory, as it indicates to my mind the very opposite state of things, namely, a vast extent of ice-covered sea, having little land, as I shall attempt to explain later on.

Let me now quote from Mr. Markham's paper, printed in the "Ethnological Transactions of 1865, folios 125 to 137."

"First, the Arctic Highlanders are by *evidence*, not branches of any Eskimo tribe of America or its islands. The American Eskimos never go from their own hunting range for any distance to the inhospitable north. The American Eskimos live in snow huts, the Arctic Highlanders in igloos built of stone. The former have bows and arrows, the latter have none. The Boothians have sledges of rolled up sealskin, the Arctic Highlanders have sledges of bone."

I must endeavour to reply to Mr. Markham's arguments in favour of his theory, taking them in detachments as it were.

Mr. Markham says that the American Eskimos always live in snow houses. In the first place, this is at variance with fact, for all the Eskimos of America, west of the Mackenzie, along a coast line of many hundreds of miles, build their winter houses of wood.

There are probably none of the human race that so readily adapt themselves to circumstances as the Eskimos. Assuming it as a fact, that they had formerly lived on the shores of Siberia, we find that their winter dwellings there had been formed of stone, earth, bones, &c.; these bones are of such description as to prove that large marine animals formed a great portion of the food of the people when in that locality, and consequently they had an abundance of oil and blubber to burn and keep their youths warm. When these people in their

migrations crossed Behring Straits to America, they found quantities of drift wood, which they learnt, probably very soon, to use for house building, although up to the present time (according to Dr. Simpson) they burn no wood, but have oil lamps for heating and lighting purposes, because walrus, whale, and seal abound along this coast. When some distance east of the Mackenzie River, the wood and the whale, and the walrus disappear wholly, or are not easily obtainable. Then what does the Eskimo do under these changed circumstances? He cannot build a wooden house, for he has not the materials; if he built a house of stone, earth, bones, &c., such as his ancestors used in Siberia, he has no oil with which to heat it; his chief food now being venison and fish which yield no blubber. He therefore does the wisest thing he could do, and builds a snow hut, which he knows is much warmer and more comfortable than a stone one, when he has no artificial means of heating it.

Wandering eastward, to the shores of Hudson's Bay, we find the natives still using the snow dwelling. But when they reach the Greenland coast, what happens? The Eskimos again finding themselves among animals that yield them the same kind of food and large quantities of fatty matter, as they are believed to have had (on the evidence of the bones of animals found there) at their old quarters on the coast of Siberia, resume their ancient form of winter habitation, because with fuel, it is warmer than the house built of snow.

One curious fact has struck me, and that is: the Eskimos from the Mackenzie River, westward to Behring Straits, use the large woman's boat or *Oo-miak*; eastward from the Mackenzie for a couple of thousand miles or so, no *Oo-miaks* are seen, until we come to Greenland and Hudson's Straits, where we again find them. One reason for this may be that when the Eskimos live chiefly on land animals and fish, they have not so much use for these luggage boats, which are sometimes large enough to carry several tons weight.

This is rather a long digression, but I hope you will excuse it.

The statement that the American Eskimos do not go far from their hunting range is not in accordance with fact, for I have known them travel northward some hundred miles in one season, and then had they heard of game still farther north, they would have followed it up.

The American Eskimos use bows and arrows, because they are the weapons best suited for killing most of the land animals which form their chief food; whereas the Arctic Highlanders employ harpoons and lances, because these are best for killing seals and walrus, &c., for which bows and arrows would be all but useless.

The Boothians use sledges of rolled-up sealskin, not from choice but of necessity, because they have little or no wood, and no large bones of the walrus or whale with which to construct them, as the Arctic Highlanders have.

Mr. Markham goes on to say, "In proving that the Arctic Highlanders are distinct from the American Eskimos, I do not mean that they are not all of the same race, but that they have had no communication, since their ancestors left Siberia, and crossing the meridian of Behring Strait, wandered to the eastward.

"The American Eskimo migrated at some remote period from Siberia, by way of Behring Strait. The migrations from the northern coast of Siberia were later. Their exodus took a distinct and more northern route along the coast of the Parry Islands to Greenland. We may infer that they (the Arctic Highlanders) did not come from the south, for the same reason that the American Eskimos have never gone north to the Parry Islands."

So much for Mr. Markham's opinions in 1865. Let us now hear what he says in 1876 (see "The Academy," 2nd December, 1876), when writing about the recent Arctic Expedition.

"The existence of this sea of mighty floes to the north of Grant's Land, has caused a revolution in our notions of arctic geography, and has dissipated many cherished theories!! In the belief that there might be land, and occasionally navigable sea, over part of the unknown area, we had in imagination led the tribes which some centuries ago disappeared from Siberia, partly along the shores of the Parry Islands (an undoubted route), but partly also across the open polar sea and bird-frequented lands, which *inaccurate information* led us to expect in the far north. We now know that the latter was impossible. No wanderers ever crossed this sea of ancient ice.

"Those vestiges which are scattered so thickly along the shores of the Parry Islands and Bank's Land, were doubtless left by wanderers from Siberia, but their route must have been along the edge of the Palæocrystic Sea, not across its rugged and impassable surface.

"The emigrants must have travelled along the coast of North America, crossed the strait to Bank's Land, and so have found their way along the shores of Parry Islands, where such numerous vestiges of them remain, to Baffin's Bay, &c."

Thus the lapse of 12 years, or more probably the results of the recent Expedition, appear in a most unaccountable manner, to have changed completely every thought and opinion expressed by Mr. Markham in 1865, as the numerous and lengthy extracts from his writings show.

His geographical and historical facts, upon which he built so

fine a superstructure, he himself has thrown to the winds, and his imaginings, by his own showing, become the "baseless fabric of a dream," yet he endeavours to excuse his mistakes, by saying that he was led away by *inaccurate information*, information of "bird-frequented lands, &c.," of which no one could have known anything, for Mr. Markham tells us himself, that the whole distance of 1,100 miles from Siberia to the Parry Islands was "totally unknown;" where then can "the inaccurate information" have come from, unless conjured up by his own fertile imagination?

How the discoveries made by the Expedition of 1875-76, could have led to or produced so total a change in Mr. Markham's opinions, it is most difficult to understand, unless it be that he is desirous of showing that sledge travelling over these so-called ancient floes, is perfectly impossible to healthy experienced men, because it baffled a band of most gallant, but inexperienced sailors, not in health, but suffering from one of the most debilitating and painful diseases with which anyone can be afflicted. I give this reason, at a venture, for I really can find no other.

The scene of the labours of the recent Expedition was fully 600 miles distant at its nearest point from Mr. Markham's imaginary migration route, so that the state of the ice at or near the north shores of Grant's Land, could not have had the most remote bearing on the practicability of such route between Siberia and the Parry Islands, made apparently so easy by Mr. Markham 12 years ago.

Permit me to trespass a very few minutes more on your indulgence, by reading an extract from the paper read by me before the Ethnological Society in March, 1865, to which I have alluded.

"All the Eskimos with whom I have communicated on the subject, state that they originally came very long ago from the west, or setting sun, and that in doing so they crossed a sea separating the two great lands.

"That these people (the Eskimos) have been driven from their own country in the northern parts of Asia by some unknown pressure of circumstances, and obliged to extend themselves along the whole northern coast line of America and Greenland, appears to be likely, and that the route followed after crossing Behring Strait was of necessity along the coast eastward, being hemmed in by hostile Indians on the south, and driven forward by pressure from the west. When they reached the meridian of Bank's Land, they had in part crossed to it, and to Wollaston Land, and thence northward to the Parry Islands, on all of which we know that animal life in the form of musk cattle,

reindeer, and smaller game, abound. Travelling eastward, they finally reached Greenland by crossing the intervening straits and sounds, or by coming round by North Somerset, and thence across Lancaster Sound or Barrow Strait.

"An ingenious theory has been started, to endeavour to show that Greenland may have been peopled by the Eskimos coming direct across the ice-covered sea from Asia to Bank's Land and the Parry Islands, but the idea seems to have little to support it, beyond the supposition that there are many islands or much land not far distant to the north and west of these places. The reason assigned for this belief is the immense thickness of the ice forced on or near to the north-west shores of the Parry Islands, which it is supposed would drift away if not held in by land.

"From the fact of the very great accumulation of ice in this position, I should arrive at the very opposite conclusion, namely, that to the north-west and west there was, instead of land, a large extent of sea, and that the pressure of great bodies of ice driven by the prevailing north-west gales had forced it into large heaps, so hard and fast aground, that for a great length of time no winds from an opposite direction could remove it."

Such were my opinions twelve years ago, and their correctness has been rather confirmed than otherwise, by all that we have since learnt, even to the conversion of Mr. Markham himself.

A Discussion took place, in which the President, Mr. Hyde Clarke, and others took part.

Dr. RAE, in reply to questions by the President and others, said that he was not sufficiently conversant with the subject to offer an opinion of any great value as to whether the ancient people who had used the stone and bone implements found in France and elsewhere, were Eskimos or not.

That question could be better decided by those distinguished men who had made the subject of Anthropology their special study.

He should, however, infer that they were a different people, because, although the implements resemble each other, they do not do so more than might be expected, where a race of men, although not the same, have lived a similar kind of life, and had the same materials of which to construct their tools and weapons.

The stones of which the lamps and kettles are made is found at various parts of the coast, frequently some hundred miles apart, and these form a valuable article of barter by the Eskimos in the neighbourhood of such localities. These lamps are found in use along the whole north coast of America, from Behring Strait to Hudson's Bay, and also, he believed, in Greenland.



Mr. R. B. HOLT then read the following paper:—

*The EARTHWORKS at PORTSMOUTH, OHIO, U.S.*

MR. G. S. B. HEMPSTEAD has sent a plan of the Earthworks at Portsmouth, Ohio, Pl. IV, and a pamphlet respecting them.

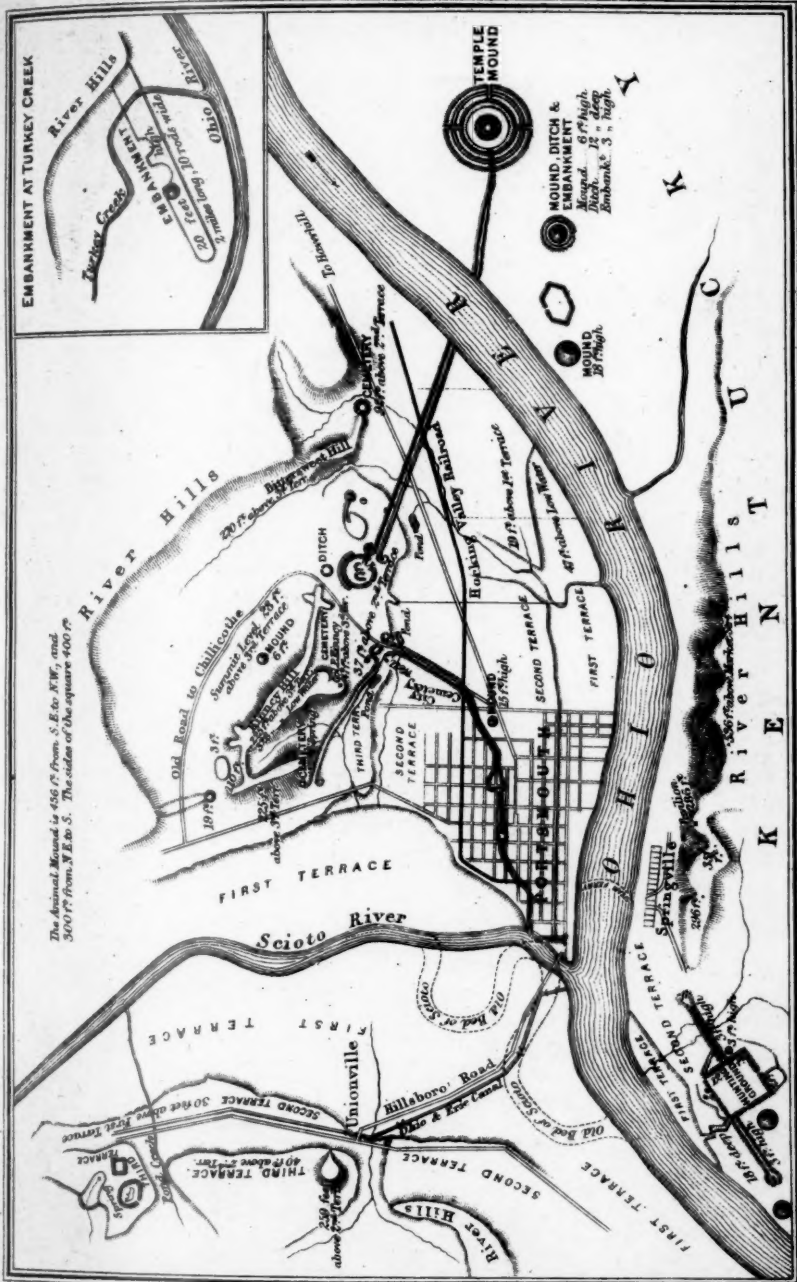
These works were evidently constructed by a very ancient people, and consist of extensive terraces, enormous mounds and ditches, long lines of parallel embankments, and models of animals on a gigantic scale. The terraces contain many hundreds of acres suitable for agricultural purposes, and were probably formed to facilitate such operations. The first rises 47 feet above the water level. The second 19 feet above the first, and the third 37 feet above the second terrace. About the centre of the third terrace is the principal mound, which rises in its highest part 328 feet above the water level. Its length, including the arms, is 20,014 feet, and the width at its base from 100 1,320 feet. The north and south ends have been cruciform.

To the west is a large cross now wanting an arm, while pointing towards the rising sun is a very long arm, which still retains the cross form most perfectly.

Mr. Hempstead considers this mound is artificial, because "The stratification of the adjacent hills is wanting in this, and because the quantity of earth that has been removed between it and the river, is about what would be required for its formation." A most extensive view is obtained from the summit, particularly down the Scioto valleys to the Franklin country. Along this route is a series of mounds, which Mr. Hempstead suggests may have been used as signal stations, and from this he infers that at the time of their construction, the whole district was under one government.

About two miles N.E. is an embankment from 12 to 15 feet high, about 2 miles long, and over 200 feet wide at the top. It is remarkable for having two semicircular indentations, and a mound near the middle of it. A short distance from the end of the long cross is an apparently defensive work, probably the citadel. It consists of a circle with four openings, facing N.E. and S.E., N.W. and S.W. The walls are now only about 2 feet high. Within this circle are two horse-shoe formations 12 feet high, and measuring 105 feet at the open ends. Outside the S.E. gate are two other horse-shoes, 3 feet high, and measuring 12 feet at the open ends. These, with other mounds in the neighbourhood, seemed formed to guard the entrance to the space between the parallel embankments, which begin here and run parallel S.E. for about 4 miles, much resembling the long

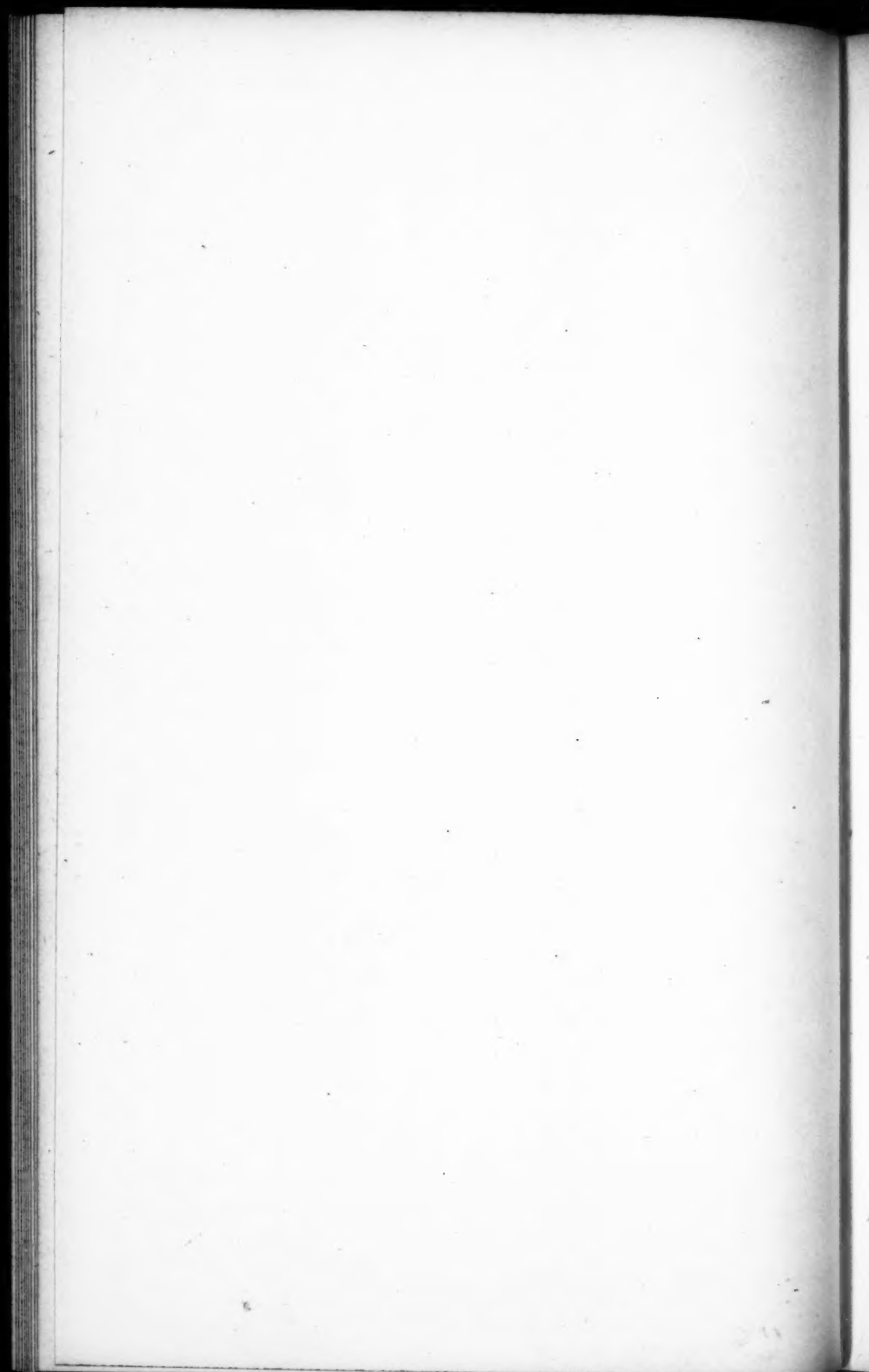




J.P. & W. E. Embley, Lith., London

EARTHWORKS, PORTSMOUTH, OHIO.

C.S.B. Hempstead, del.



walls of a Greek colony. He says, "I examined them as early as 1806, when they were from 3 to 8 feet high. When riding over these embankments, my horse would frequently break through the surface, and sometimes fell. This occurred so often, that I became curious to know why they were so insecure. On examination, I found a cavity which had been occupied by two pieces of timber parallel to each other; these had decayed, and left the surface earth without support. This, with some other facts tending to the same conclusion, has convinced me that the parallel walls, and perhaps the mounds, were first constructed of timber, held together by cross ties, and then filled with surface earth. Constructed in this manner, there is sufficient material to have made a wall 4 feet thick, and 20 or 30 feet high. These dimensions seem a little out of proportion, and it would have been far easier to have constructed a wall of less height and greater thickness."

The embankments run down to the river, and are continued on the opposite side till they reach a large circular work, which was probably a temple of the sun. Apparently a mistake has been made in constructing this part, as about half way a slight deviation is made, in order that the entrance into the sacred circles may face due west. This way alone gives access to the centre of the structure, the north, south and east entrances terminating outside the inner ditch.

The outer circle measures 640 feet, the second one about 400, and the third about 300. In the centre of this innermost circle is a mound which rises 45 feet above the surrounding surface. It has a spiral graded way leading to the top, which measures 50 feet east to west, and 75 feet north to south. This probably was the high altar, and the ceremonies performed on it could be readily witnessed from the surrounding mounds. The temple then, consists of three embankments pierced by ways leading N.S.E.W., a centre mound and four ditches, the last to be passed only by the road leading from the citadel, the entire length of which was protected by parallel walls.

About a mile and half west of the temple is a circular embankment, about 6 feet high, and an inner ditch about 12 feet deep. It has a centre mound about 7 feet high and the entrance is from the south.

Beside it is an enclosure in the form of an irregular hexagon. It measures 120 feet by 75 feet. When first observed the embankment was 4 feet high, and the ditch, which is also inside, 3 feet deep. There are two entrances facing N.W. and S.E. Three quarters of a mile west is a mound 18 feet high, without either ditch or embankment.

All these had probably some connection with the temple.

From the end of the long cross the temple would mark the spot at which the sun rose at the winter solstice, and a square enclosure, situated N.W., would mark sunset at the summer solstice.

This enclosure has also four entrances, and they, like those of the temple, face N.S.E.W. Close beside it is an ovoid enclosure, measuring 459 feet by 390 feet. Within it is a mound in the form of a tapir. Whether this was an object of worship, a record of some event (like our own White Horses), or merely a work of art, cannot now be determined, but certainly such mounds were not sepulchral, as many have been removed without ever finding any remains of the dead.

In this locality were several iron works which are now obliterated. Among others were the remains of furnaces, broken stones, burnt clay, ashes and coal, and, on excavating for the Ohio and Erie Canal, large sheets of mica were found here deposited in piles as if for use. Some industry may have been carried on, but as no actual implements seem to have been discovered in connection with this people, more probably it was a place for sacrifices or for burning the dead. Besides the parallel embankments going S.E. from the long cross, there are others running N.W. and S.W. from an oval enclosure, situated about a mile to the west of the citadel. The N.W. ones reach the extreme west of the great mound. The S.W. ones terminate at the river, and in two places are expanded so as to form considerable enclosures. Small mounds are constructed at all the ends, as if to fortify the entrances across the river, and nearly facing the end of the S.W. parallels is what has been known as the Old Fort.

Of this Mr. Hempstead says, "The title 'Old Fort' I consider a misnomer. A careful examination of this work must satisfy anyone that it was never intended as a protection against enemies from without. It is placed far from what was the centre of population (and there are no evidences of any occupants S.W. of it for many miles), so had the people found it necessary to repair to this place for protection, they would have found it very inconvenient. Admitting that the parallel walls, extending S.W. from the main settlement, would have protected them in their retreat, a large river to pass would have been a great impediment to their progress. But the work was evidently never intended to keep anything out, and is calculated to keep anything in after it has once been decoyed or placed there. The whole work is commanded from the River Hills, which are in close proximity on the S.E. side, where the wall is only 2 or 3 feet above the adjacent surface, while on the inner side it is 25 feet in height.

An enemy having gained this eminence could annoy those within from all parts of the embankments, and could only be assailed from the gateways or the top of the wall. There are many strong reasons for believing that this structure was intended to entrap those large animals which roamed over the hills and ranged through the valleys at that time. There are long arms extending more than a mile N.E. and S.W., with parallels only about 100 feet apart, and numerous gateways which furnish abundant means of entrance from without. As regards the people, Mr. Hempstead says, "that there were two races, a dominant and a servile one, cannot be doubted; the skulls found in the small mounds are always brachycephalic, while others found in gravel banks and other places, where the interments were apparently made without ceremony, are of the dolichocephalic cast. Some sixty years ago I assisted in opening eighteen or twenty mounds, whose elevations were from 3 to 9 feet. In two of the small mounds we found two skeletons, in both cases a male and a female.

"In the others were found remains of the dead. In the larger mounds were proofs of cremation, charcoal, ashes, burnt earth and burnt bones, only the phalanges of the feet and hands remaining entire (Qy. why?). These were quite numerous, indicating that more than one body had been burned. An occasional lower jawbone in an entire state was found; these were so large as to pass freely over the lower jaw of the largest and best-developed young man of our company. Besides the mounds, large burial places are found. One field, containing six or seven acres, situated on the second terrace due west of the termination of the north-west parallels, was, fifty years ago, such a mass of human bones, that after ploughing, the surface was quite white with them; another field of eight acres is of similar character.

"Both these fields are very productive of stone axes, pipes, arrows, and spear heads, as well as a great variety of stone ornaments and implements. There are also isolated interments in the gravel beds, which lie a few feet below the surface near the top of the second terrace, and here entire skeletons are frequently obtained.

"There are also cairns, situated in all cases upon the tops of the highest headlands. They are conical in form, and consist of stones, none of which are larger than a man could easily handle. These are thrown together promiscuously. The cairns never contain more than one skeleton, and are destitute of any of the paraphernalia of burials of that period; no arrow or spear points, no axes, no ornaments, not even a pipe, to console the occupant on his last journey.

Mr. Hempstead considers that an immense population once occupied this locality; that they were good cultivators of the land, were acquainted with geometrical forms, and were more civilized than any prehistoric race yet discovered.

The following note by Professor Busk on the photographs of skulls exhibited was also read.

"The photographs show that the skulls belonged most probably, at any rate one of them, to a brachycephalic race, and the contours correspond very closely with those of the brachycephalic type of Red Indians of which the Chinooks, Flat Heads, ancient Peruvians, and many other of the Indian races, afford such well-known examples. The other photograph appears to belong to a different type, and is probably dolichocephalic.

"Its chief peculiarity is the great occipital development. The forehead is not reclined, as in the other figure, and is tolerably well developed. The face, however, would seem to indicate a somewhat savage type, *i.e.*, one in which the facial region is largely developed; and the opening of the nares would seem to indicate a broad coarse nose. On the whole, there can be little doubt that this man belonged to an Indian race, and with regard to the form of the cranium, it should be remembered that many more or less dolichocephalic races of Indians exist or have existed in the interior of the continent, though not, I believe, near the sea-board.

"The Mandans, now, I imagine, extinct, belonged, if I remember rightly, to this form, and a similar conformation, according to Mr. Wilson, is still found in Canada, &c.

"So far, therefore, as we can at all judge from such scanty evidence as that of the present photographs, it would seem not improbable that the same two forms of crania co-existed among the mound builders."

#### DISCUSSION.

Mr. F. A. ALLEN said that he had alluded to the antiquities in the Mississippi and Ohio valleys in a paper which he contributed to the Congrès International des Américanistes held at Nancy in 1876.

The vast antiquities of the Mississippi valley might, he thought, be referred to a colony of the Brown Indians or Toltecs, who, in pre-Aztek times had occupied Mexico as far as the Colorado cañon, and passed through Texas into the Mississippi valley, thence ranging as far north as Lake Superior. He thought all the earthworks, embankments, mounds, &c., might be illustrated by reference to the colonies and *pueblos*, or communal houses of the Pueblo Indians, now rapidly dying out in Arizona and New Mexico, these Indians being probably the successors and imitators



of a more civilized race. In these *pueblos* we find large terraces, irrigated artificially, systems of defensive walls (like those of Inscala, China, &c.), watch-towers, temple mounds, and relics of sun-worship.

The Indians of Kentucky record traditionally the conquest of this superior race by their ancestors, and some details of the conflict. The Indians of Florida and Georgia had temples and palaces on high artificial mounds at the time of the conquest, and some of the others were probably "totems" or tribal-crests, and burial-mounds, analogous to the "huacas" of Peru.

Mr. HOLT, in reply, said he thought Mr. Hempstead was right in supposing that the structure known as the "Old Fort" was a place for the capture or detention of large animals.

He could not agree with Mr. Hyde Clarke, in believing that these cairns were the burial places of heroes. The great men of this people seem to have been buried in mounds, and, as usual, with the arms, ornaments, and articles supposed to be of use to them in their long journey; while in the cairns the interments were made without any such mark of respect.

Dr. Rae exhibited an Eskimo lamp, and explained its use.

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MAY 8TH, 1877.

JOHN EVANS, ESQ., F.R.S., *President, in the Chair.*

The minutes of the previous meeting were read and confirmed.

The following presents were announced, and thanks were ordered to be returned to the respective donors for the same, and a special vote of thanks to the Vienna Government, and also to Dr. Karl de Scherzer for a complete set of volumes relating to the voyage of the "Novara":—

FOR THE LIBRARY.

From the INSTITUTION.—Journal of the Royal United Service Institution. Vol. XXI, Nos. 89, 90.

From the ACADEMY.—Proceedings of the Davenport Academy of Natural Science. Vol. I.

From the INSTITUTION.—Annual Report Smithsonian Institution, 1875; Smithsonian Contributions to Knowledge. Nos. 259 and 287.

From Professor F. V. HAYDEN.—The Grotto Geyser of the Yellowstone National Park.

- From the SOCIETY.—Verhandlungen des Naturhistorisch-Medicinischen Vereins zu Heidelberg. Vol. I, No. 1.
- From the ACADEMY.—Bulletin de l'Académie Royale de Copenhague. No. 2, 1876.
- From the AUTHORS.—Caractéristique physique de la population de la Galacie. By Dr. J. Majera and Dr. I. Kopernicki; Des préjugés médicaux et des croyances superstitieuses du peuple en Pologne; Le congrès d'Archéologie et d'Anthropologie préhistoriques à Buda-Pesth. By Dr. I. Kopernicki.
- From the Berlin Anthropological SOCIETY.—Zeitschrift für Ethnologie. No. VI, 1876.
- From the Austrian Government.—Voyage of the "Novara." Anthropologischer Theil 1, 2, und 3; Zoologischer Theil 1. Bd. 1 und 2, Abth., A. B., Text und Atlas; Botanischer Theil, Bd. I; Linguist. Theil 1867; Geologischer Theil 1 und 2, Bd., Statistisch Commerçiller Theil 1 und 2; Nautisch Physikalischer Theil 1, 2 und 3; Medizinischer Theil 1, Bd.
- From the EDITOR.—Matériaux pour l'Histoire de l'Homme, March, 1877.
- From the SOCIETY.—Proceedings of the American Philosophical Society. Vol. XV, No. 96; XVI, 98.
- From A. H. LEWIS, Esq.—Chart of West Africa.
- From the EDITOR.—Nature, to date.
- From the EDITOR.—Revue Scientifique. Nos. 44 and 45. 1877.

Mr. Martin exhibited objects from a large refuse heap in the neighbourhood of Smyrna, and made the following remarks thereon :—

On the 20th May, 1876, I visited Smyrna, and spent part of the few hours I was in that city in inspecting, at Mr. Hyde Clarke's suggestion, the supposed kitchen-midden. It is situated about a third of the way up the hill towards the castle. The hill is of hard rock, barely covered with soil, which rock is extensively employed for building purposes. The road is principally used by men quarrying the stone, and has exposed a large section of the heap. I had no means of measuring it accurately, but it is certainly several hundred feet long, and from 8 to 12 feet thick.

In it I found bones, pieces of pottery, and layers of oyster and other shells, the oysters were remarkably massed together. Here and there were layers of charcoal, but I could find no trace of flints or of flint implements.

The whole of the country at the back of the city is archæologically unexplored, and any light that can be thrown on the early history of Asia Minor is valuable.

I may mention that being *above* the city and *up* the hill, the heap cannot be the refuse of the city of historic times, which appears always to have occupied its present position, and it would not have been possible that the thrown-out rubbish would be put up hill and

not down, and we have no record of any city earlier than the one now existing, which has had a continuous life from the earliest historic times.

Mr. Hyde Clarke, whose long acquaintance with the country makes him familiar with this place, will give you far more information than I am able to do, and I may conclude by saying that all the fragments I have placed on the table were found *in situ*, and none picked up from the surface.

MR. HYDE CLARKE: The remains which Mr. Martin describes were on Mount Pagus, the Castle Hill, at Smyrna. What they are I do not profess to know, and I can account for them on no hypothesis. They have been observed by travellers, and have been described as a geological formation, with beds of fossil oyster shells. My specimens are unfortunately lost, as are my notes, which I suppose I communicated to Mr. Murray. My attention was only called to this place during the latter time of my stay in Asia Minor. Speaking from memory, the deposits extend about 600 feet in length, and are in one place perhaps 100 feet broad. The essential peculiarity is the three thin layers of oyster shells, lying perfectly parallel for long distances. It is impossible to account for them by the supposition of the oysters being eaten *in situ*, or the shells being flattened by compression. With regard to the pottery, it is not easy to define the age, and it cannot be treated as Roman, because such pottery was made for ages in Asia. Samian ware is so called from the neighbouring island of Samos, where were found the clay beds in my time, and Samian and other pottery-making was learned by the Romans from the Greeks and Asiatics, and not by the Asiatics from the Romans. It would very naturally be supposed that the rubbish was thrown over the walls, or carted outside of the walls; but then comes the question why were the oyster shells so carefully arranged? It may be mentioned that in Wood's "Ephesus," a layer of oyster shells on a foundation is described. The date of the deposit must be Byzantine, or very ancient, possibly *præ-hellenic*, as the city of Smyrna has in most periods, as now, been on the sea-shore, and the Mount Pagus enclosure has only been occupied at the two epochs referred to. It is most desirable this place should be examined by visitors to Smyrna, as also the better-known monuments of the tomb of Tantalus opposite, described by Texier, the Niobe, and Mount Sipylus, the pseudo-Sesostris at Nini (Nymphæ), and its lately discovered companion; the site near Smyrna of the colossal head, brought to the British Museum by Mr. Dennis, and the remains behind Boujah. I long since pointed out Smyrna as a *præ-hellenic* region, and then I connected it with what I now call the Sumerian or Khita-Peruvian epoch. The discoveries of Dr. Schliemann render it most desirable consequently to have a re-examination of the Smyrna district under another aspect, because it has been hitherto regarded as simply Greek. The name of Smyrna is most remarkable, and none the less that Samorna was a name given to an ancient quarter of Ephesus. It is undoubtedly a Sumerian name. Sipylus is remarkable as possibly taking its name from

Suburn, Accad. a sculpture, referring possibly to the Niobe. Nymphæ is another notable name. To these must be added the neighbouring Ephesus, Samorna, Pygela, Mæander (Mdinare, Georgian, river), and a host of others. Smyrna and Ephesus were Amazon cities. Smyrna is the place most accessible from England where monuments of the proto-historic epoch, probably Khita-Lyidian, can most readily be seen.

Col. LANE FOX: The pottery exhibited by Mr. Martin has all the characters of Roman workmanship; the piece of the handle of a jug, &c., the lip of a bowl especially so, the small fragment of red Samian certainly so; none of the fragments at all resemble pottery belonging to the archaic period of Greece. The observation made by Mr. Hyde Clarke as to the layers of shells being stratified more or less, seems to me not at all improbable in the view of the mass being a refuse heap or a kitchen-midden. I have cut out several kitchen-middens at different times, and have usually found such deposits to present a stratified appearance. Shells or other refuse of a particular kind are often shot down in quantities at a time, then other rubbish comes upon the top, and the weight of the superincumbent mass presses the various deposits down into seams as if laid by water.

The PRESIDENT, judging from the presence of so-called Samian ware among the pottery, the shape of some of the fragments, and the character of some wall-plaster, was inclined to regard the objects exhibited as of Roman date. He thought that the deposit was rather of the nature of a rubbish heap, such as frequently found in the neighbourhood of Roman sites, than of a kjökking-mödding properly so-called.

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Mr. A. L. Lewis read a Note on a Rude Stone Monument in Kent, of which the following is an abstract.

*On a RUDE STONE MONUMENT in KENT.* By  
A. L. LEWIS, M.A.I.

It may be doubted whether, out of every 10,000 visitors to Kit's Coty House and the fallen dolmen called the "Numbers," 100 visit the stones in Addington Park (some 7 miles off), which are figured by Camden as two circles, but which were more probably dolmens, one of which had an avenue at least 180 feet long, running in a south-westerly direction from it, and both which have been more fully described by me in "Anthropologia" (p. 511 *et seq.*).

If, however, 100 visitors out of 10,000 go as far as Addington, not more than 1 out of that 100 goes to or even hears of a yet more curious collection of stones at Colderham or Coldrum Lodge, which is about 2 miles from Addington, and one and a-half from Snodland Station.

Here, on the summit of a steep slope, some 20 feet or more above a private roadway belonging to the farm, lie thirteen stones of a medium size, almost touching each other, which may have formed the north-western half of an oval; and about 15 feet from which to the north-east lie three stones, which, if any of them are in their original positions, follow the rule for outlying stones which I have so often shown in previous papers to exist in our English circles. About 12 feet from the spot where the south-eastern half of the oval (if oval it were) would have stood, are the remains of what was no doubt a sepulchral chamber. Two stones, 9 to 10 feet long, 5 to 7 feet high, and  $1\frac{1}{2}$  to 2 feet thick, stand about 5 feet apart, forming the sides of the chamber, and parts of the stones which formed the end nearest the oval also remain, but the other end projects over a small precipice about 10 feet deep, caused by the slope before-mentioned having been dug away or having slipped; and at the bottom of this precipice are scattered about ten stones of various sizes, which have no doubt fallen or been thrown down from above, where they probably formed part of the chamber or of the oval, which seem to have been two distinct erections.

While speaking of the Kentish monuments, I may mention that the proprietor of a small domain about a mile from Seven-oaks Station has thought fit to adorn it, at great expense, with (*inter alia*) a great number of large blocks of granite, arranged in circles and otherwise. At the present time there is no danger of these being mistaken for ancient monuments, but in the course of years they may become less readily distinguishable from the genuine articles, and in that case some speculation may be aroused by the unusual manner in which they are arranged; and the presence of a classic pillar amongst them may even be brought forward as evidence in support of Dr. Fergusson's theories. I think it may, therefore, be worth while to put on record the true origin of these spurious imitations, the construction of which is, in my opinion, as much to be regretted as is the occasional removal of original monuments from the place where they were erected to some other, for the gratification of the fancies of those who have unfortunately become their proprietors.

#### DISCUSSION.

Mr. HYDE CLARKE said that the name Colderham suggested the association of Cold Harbour. The application of Cold in Cold Harbour, and in such names of Germanic places, remained undetermined. He had greatly extended the copious list begun by Mr. Hartshorne, and had added other members to the series. So far as

he had seen, a Cold Harbour, or a "Cold" site, was commonly near a Roman road or site: but looking to our present knowledge, he thought there was ground for further investigations. Harbour, in most cases, signified military station or camp. "Cold" was a distinctive term applied by our forefathers to the harbour and other sites. The suggestion he would make to pre-historic and archaeological inquirers was this: Is the term cold to be found, as in Mr. Lewis's case, in the neighbourhood of a pre-historic monument, and if so, did our forefathers distinguish between a Roman camp, or station, which was a Chester, and the abandoned pre-historic camps, or stations. Although he had stated now and previously that Cold Harbours were situated near Roman roads and sites; yet these would in many cases represent pre-historic or Sumerian sites, for just as the Roman civilisation was destroyed by the English invaders; so was the previous civilisation of Sumerian epoch destroyed by the Celts in Britain and Ireland.

Mr. LEWIS said, in reply, that the name Colderham was also, and perhaps more frequently, spelt Coldrum. The greatest objection to viewing the stones in their present position, as forming part of the original plan of one monument of any form whatever, was that while those which he had called the oval and the sepulchral chamber were on a level plateau, and probably *in situ*, the remainder were at the foot of a steep slope 20 feet deep, down which they had probably fallen or been thrown.

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Dr. John Rae then read the following paper:—

#### ESKIMO SKULLS.

I HAD the privilege of attending the series of admirable lectures so ably given by Professor Flower at the Royal College of Surgeons a few weeks ago, on the "Comparative Anatomy of Man," from which I derived much useful information, and on one point, very considerable food for thought.

I allude to the wonderful difference in form exhibited between the skulls of the Eskimos from the neighbourhood of Behring Strait, and of those inhabiting Greenland, the latter being extremely dolichocephalic, whilst the former are the very opposite—brachycephalic; the natives of the intermediate coast, from the Coppermine River eastward, having mesocephalic heads.

Why this difference? and which is the true Eskimo type?

We have no knowledge, as far as I am aware, of the Eskimos using any means in the form of bandages or otherwise, to change the shape of the skull; indeed, the heads of the Eskimo children, whenever I have seen them, have been left singularly free in



infancy from pressure of any kind, less so than most little ones, their usual cradle being the hood of the mother's coat.

It is well known that the Western Eskimo, by which I mean those near Behring Strait—are now and have been for a very long period of time, on terms, if not of friendship, at least of acquaintanceship sufficiently intimate with the Indians to visit and barter with each other, and there is said to be evidence of mixture of the races. If this is true, it may have aided in producing the form of head found among these Eskimos; the head of the American red man being brachycephalic.

We know that for at least a hundred years, and it may be for a much longer period, the Eskimos frequenting the American coast from the Coppermine River eastward to Hudson's Bay, have been at constant and deadly feud with the Indians, and that no friendly relations of any kind has taken place between them until very lately. There is, however, a tradition among the Indians near the Coppermine, that the Eskimos on one occasion carried off a young girl of their tribe. This may be true, for there is one family of Eskimos in that locality which struck both Thomas Simpson and myself as having something unusual in their appearance, being taller than, and having features different from those of their neighbours. This, however, was the only case of the kind we noticed.

But how do the Eskimos of Greenland get their long heads? If the ancient colonists who went from Iceland to Greenland many hundred years ago, and who were believed to have been all destroyed by the Sknelings (Eskimos), were dolichocephalic, the question might perhaps be answered; for it is by no means improbable that these lost people may have had Eskimos as domestics, or may have taken their women as wives, in the same manner as is done at the present day by the Danes, whose blood is now so largely mingled with that of the natives there. The Sknelings also when they destroyed the settlements may have carried away some of the women and children as captives, a common occurrence in all (especially savage) warfare.

If there is any foundation in fact for the theory I have suggested, the pure type of Eskimo is to be found among those inhabiting the coast from the Coppermine River, eastward to the shores of Hudson's Bay, who are said to have heads intermediate in form between those on the extreme west and the natives of Greenland.

#### DISCUSSION.

Mr. HARRISON: Is the deformation artificial?

Dr. RAE: No, as far as I am aware. The head of the Eskimos child is never tied up like that of the Indian of America.

Mr. CLARKE: Has Dr. Rae observed difference between half-blood and true Eskimos?

Mr. EVANS: Might not the carrying in the hood produce the ridge shape?

Dr. RAE: I can only give ideas, as I have no measurements. I take a fact for showing perpetuity of type in them by the Fair Isle people, who are said to resemble the Basques, in consequence of a mixture of blood when one of the Spanish Armada was wrecked on that island. They still dye with native dyes and manufacture woollen in the same manner as the Basques are said to do. I believe the Greenlanders came from the west. They could only get it (the form of head) by crossing. The hood-carrying of children applies to all Eskimos, as far as I know, and would likely affect all alike.

Col. LANE FOX: Do they differ in stature or colour?

Dr. RAE: Not greatly. They are not a small people, their legs being comparatively short make them appear so.

Some discussion followed on the change of physical form in America and Australia.

Dr. BEDDOE: It is possible that there was an admixture of Norse blood in the Eskimo of Greenland, prior to the Danish settlement there. The Eskimo traditions lately published by Dr. Rink, in his recent work on "Danish Greenland," supply additional and more direct evidence in favour of this view, not by any direct statement as to intermarriage, but by the kind of intercourse which they seem to imply as existing between the Norsemen and Skrallings. The long roof-shaped skull of the Eastern Eskimo, could hardly however have resulted from an Icelandic cross. There are two types in Norway, round-headed and long-headed respectively, the longer heads abounding near the coast, and belonging to the ruling and colonising race. One would expect the Icelanders to belong chiefly to this long-headed type, and some measurements of Dr. Hjaltalin, taken for me, rather bear out this view; but Captain Burton speaks of them positively as broad-headed. Certainly they would not be so long-headed as to account for the Greenland form of head.

Col. LANE FOX: The fact introduced to our notice by Dr. Rae, that the skulls of the western Eskimo are brachicephalic; those of Greenland and Labrador, dolichocephalic, and those of the intermediate tribes of transitional form between the two, is, so far as I know, new to Anthropology it is at least new to me, and if founded on sufficient observation, appears to me very important; I concur with Dr. Beddoe in thinking it hardly possible the mixture of Norwegian blood in the East could have been sufficient to produce so marked a change. All observation and tradition seems to point to the West as the source of the Eskimo migration; and it would be curious if it turned out that in America as in Europe, a brachycephalic people followed and pressed outwards a smaller dolichocephalic race. I should be glad if Dr. Rae could tell us whether

there is any difference in the stature or colour of the Eastern and Western Eskimo.

Mr. LEWIS would ask Dr. Beddoe whether the broad-headed people of Norway, to whose Lappaffinities he had alluded, were not of a much greater stature than the Lapps? Dr. Simms, of New York, a very intelligent observer, considered the mixture of Red Indian blood in the United States to be much greater, both in amount and influence, than was generally supposed.

Dr. BEDDOE: Not conspicuously. I judge from physiognomy that the round-heads are darker, and are partly of Lappish or Finnish descent. As to stature I cannot speak.

Dr. RAE, in reply, said: Never having myself taken measurements of Eskimo skulls, I am wholly dependent upon, and take my facts from, skulls shown and most ably described by Professor Flower at the Museum of the Royal College of Surgeons, believing such information to be the most trustworthy that could be obtained. This very short paper does not profess to discuss the subject of which it treats, its chief if not its only object being to draw attention to what appears to the writer to be an interesting question in ethnology.

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Dr. BEDDOE then read the following paper:—

*On the ABORIGINES of CENTRAL QUEENSLAND.*

By Dr. BEDDOE, F.R.S.

THE subject of the brief paper I am about to read, is not one with which I have any personal acquaintance: I have merely put together some of the materials which have been imparted to me by Mr. Robert Christison, who holds a large tract of land near the head-waters of the Thomson and Landsborough Rivers, stocked chiefly with sheep, but partly with cattle and horses, and who has been settled in that part of the colony about thirteen years. I think it probable that there is no man in Queensland (unless it be a few who are officially connected with the aborigines) who has had so much to do with these people in what may be called their wild state.

It is important therefore to state that in Mr. Christison's opinion, the current estimate of the moral, if not also of the intellectual status of these people, is very much too low. The aborigines of Queensland, and indeed of all Australia, are stigmatised as irreclaimable, and incapable of gratitude, affection or attachment to their white masters or neighbours; as thievish and bloodthirsty, and thus dangerous to the property and lives of the whites as incapable of anything like steady, honest,

continuous work, and therefore useless to the settlers; and finally, as very sparingly endowed even with those social virtues whose objects are limited to their own people, such as conjugal and parental affection.

Mr. Christison's experience traverses every point of this indictment more or less completely.

Within a few years of his settlement on the lands he occupies, where he was the earliest European invader, he succeeded in establishing friendly relations with a tribe who had dwelt there, called Dalleyburra, and numbering about 300 in all; and by a judicious mixture of firmness, justice and kindness, established himself as their ruler. Considerable numbers of them have been employed since then, in tending herds, sheep and cattle, in sheep-washing, bark-stripping, timber-cutting, and various other occupations.

Women and children have been employed as well as men; and, as might perhaps have been expected, the women are at least as useful as the men for hard or continuous work, such as attending sheep in the lambing season, and the like. Considerable alterations in their other habits have of course taken place, more or less directly connected with the acquisition of new habits and methods of labour. One of these is that of course they have learned to smoke and enjoy tobacco, and have thus established a new artificial want, which, as it links them on to the European dispenser of this luxury, is useful as supplying a motive to labour, and may conceivably be morally beneficial. The use of alcohol remains happily unknown. European clothing is adopted to some extent; shirts and blankets at all events are highly appreciated; and the cleanliness of the natives employed about the station is said to be decidedly in advance of that of the lower class of Europeans.\*

Sheep-stealing occurred, and caused some trouble, in the early days; cases of this kind were always carefully investigated and punished; and nothing of the kind has now happened for several years.

Conjugal and parental affection appear to be strongly developed in both sexes. Quarrels of course occur, and occasionally the husband may chastise the wife; but this is not common, and the tie between them is in the main one of

\* It is noteworthy that they are rapidly dropping the use of their own language as they acquire the English, or a form of English; and that their own communications with each other are largely carried on in the new tongue. The same is the case with imported Polynesian labourers. When we know that the number of Englishmen employed on Mr. Christison's stations has always been very small, the work having been almost entirely performed by natives or by Polynesians, we must recognise in this rapid change of language a very remarkable fact.

affection. Instances have happened in which a father or mother has sold a boy to a travelling squatter or other European; but inasmuch as the property supposed to be alienated invariably re-transfers himself, according to a previous arrangement, in the course of a day or two, such transactions are evidence of what Uncle Sam would call smart dealing, and not of want of parental feeling.

When kindly, justly, but firmly treated, individuals become strongly attached to their white master. When accompanying him on exploring expeditions, they have been known, provisions running short, to refuse their scanty rations for successive days, rather than suffer their master to want. It is noteworthy, considering the nature of the country and climate, that in Mr. Christison's opinion the so-called blacks are less able to bear thirst and the deprivation of water than white men, though they can go longer without solid food.

Many of the men are of good stature, some perhaps 6 feet high, with good muscular development, even of the legs, but no fat. They are like a well-known personage, not nearly so black as they are painted: the deep colour being in a great measure due to the constant use of an unguent of powdered charcoal and snake-fat, or iguana-fat, not with a view to adornment, but to comfort, as it prevents the cracking of the tender skin in their hot and dry climate. Snake-fat is highly valued, and much of it is husbanded for this purpose, though from the scarcity of fat in most kinds of food attainable, it is also esteemed a great culinary luxury. In fact, snakes furnish a great portion of their food; all kinds are eaten, venomous and harmless; but the blackman always carefully smashes the head to pulp with a stone. In the treatment of snake bites he shows a knowledge and skill hardly to be expected. Thus, a bite having been received near the ankle, he ties a ligature round the limb, and then scarifies it deeply in a circle above the wound.

I have already mentioned that the Australians cannot long endure thirst. The fact that numbers of them have been found in districts where Europeans perished, or ran the risk of perishing, for lack of water, is to be accounted for solely by their minute and accurate acquaintance with the signs of the presence of water, which enables them to discover it where white men fail to do so. They are knowing as to the qualities of water, and are aware of the risk of drinking cold water too hastily in large quantities.

Their spears, tomahawks, waddies and other weapons much resemble those used in other parts of Australia. Their boomerangs, in the use of which they have a skill quite unattainable by a white man, are small, and have a smaller curve than some

brought from South Australia. The same curious quadripartite division of the tribe exists here as elsewhere in Australia, with the recognized object of preventing in-and-in breeding.

## DISCUSSION.

Mr. EVANS : Is it the fact that these people are lighter than the South Australian blacks ?

Mr. CHRISTISON : Yes, I think so.

Mr. HARRISON : Are the infants fair ?

Mr. CHRISTISON : Yes, almost white.

Dr. BEDDOE : But the hair is always black ?

Mr. CHRISTISON : Yes, always black and curly.

Dr. BEDDOE : They talk English to each other ?

Mr. CHRISTISON : Yes, the young people do, and even the old ones sometimes.

Dr. RAE : Are they great eaters ?

Mr. CHRISTISON : Only at first ; but when they have become used to rations and regular meals, including bread or damper, they are very moderate eaters, perhaps more moderate than Europeans.

Col. LANE FOX having taken the chair, said : He felt sure the meeting would wish to return their thanks to Dr. Beddoe for his interesting communication, as well as to Mr. Christison for the information upon which the paper had been based. In a country where the arts of the aborigines are so generally uniform as Australia, minute differences, such as a resident only is likely to notice, are of great interest ; by such observations, we shall in time be able to map out all variations that have taken place in the different parts of the continent, and perhaps trace them to their sources. The remark that natives suffer more from thirst than Europeans, is singular and unexpected ; one would imagine, that in a country where such great scarcity of water exists, natural selection would have produced a race capable of great endurance in this respect, but the reverse appears actually to be the case.

Mr. LEWIS remarked that the skins of the natives of Queensland seemed to be much lighter than those in South Australia, judging from the photograph of the former then exhibited, as compared with photographs of the latter in his possession.

The meeting then separated.

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*Photo. by Capt. Steward R. E.*  
*Natives of the Sandwich Islands, and a Surgeon in the*  
*Helo. 1890.*

MAY 22ND, 1877.

JOHN EVANS, Esq., F.R.S., *President, in the Chair.*

The minutes of the previous meeting were read and confirmed.

FRANCIS A. ALLEN, Esq., of Clapham, and THOMAS PALMER, Esq., of Chislehurst, were elected members.

The following presents were announced, and thanks were ordered to be returned to the respective donors for the same :—

## FOR THE LIBRARY.

From the AUTHOR.—The Physical Requirements of Factory Children.  
By Charles Roberts, F.R.C.S.

From the AUTHOR.—Historique de l'Anthropologie. By Dr. Paul Topinard.

From the SOCIETY.—Proceedings of the Royal Society of Tasmania for 1875.

From the SOCIETY.—Proceedings of the Royal Society. Vol. XXVI, No. 179.

From the ACADEMY.—Atti della R. Accademia dei Lincei. Vol I, No. 5.

From the ASSOCIATION.—Journal of the Royal Historical and Archaeological Association of Ireland. Vol. VI, No. 29.

From the SOCIETY.—Bulletin de la Société d'Anthropologie de Paris. Vol. XII, No. 1.

From the EDITOR.—Revue Scientifique. Nos. 46 and 47, 1877.

From the EDITOR.—Nature, to date.

The President addressed the meeting on the present state of the Question of the Antiquity of Man.

WE are met this evening for the purpose, not so much of reading papers before this Institute, as for a conference on the present state of the question of the antiquity of man. The state of that question is very different now from what it was in the year 1859, when the late Dr. Falconer, Mr. Prestwich and myself first brought it forward before the British public.

It is now no longer difficult to get evidence accepted as to the antiquity of man. The danger rather lies in the other direction, and we are liable to have evidence brought forward relating to discoveries bearing upon the subject which is hardly trustworthy. In all questions of this kind extreme caution is necessary. We may in the course of the discussion this evening hear something with regard to the development of language and civilisation, and the time necessary for producing those results which we find to have been attained in the earliest historical periods; but after

all, our chief points of discussion and the proofs of the antiquity of man will principally lie within the domain of the archæologist, the anthropologist and the geologist. No one of those it appears to me is sufficient by himself to offer a very strong opinion on any given discovery unless he possesses the somewhat rare combination of the acquirements of all. The archæologist, for instance, may determine an object as being a work of human art, or the anthropologist may say that a certain bone belongs to the human frame, but unless the geologist is satisfied as to the nature of the deposits in which the object was found, there is an end to the question. In the same manner the geologist may testify to the antiquity of deposits, but if the archæologist pronounces the stone found in them to be merely a product of nature, or the anthropologist determines the bone exhumed from them to belong to some other mammal than man, again the question drops. The question, however, whether certain beds are pre-glacial, inter-glacial, or post-glacial, lies entirely within the province of the geologist, and we may hope to hear something definite with regard to at least one disputed case from the eminent geologists who have favoured us this evening with their company. Besides observations as to the objects, above all things care and caution must be observed with regard to the facts of the discoveries themselves, for there lies what appears to me to be a very possible and indeed fertile source of error; for human bones, or humanly-worked implements may belong to far more recent periods than the deposits in which they are found, and in which they might have been buried. Objects from the surface are also liable to get mixed with those from lower beds, and we cannot always trust to the observations of ordinary workmen. This source of error should more especially be guarded against in the case of cave deposits, in which may be found interments of a later date than the flint or bone instruments in the surrounding soil. I am not at present going to enter into any question or arguments as to facts. After these papers have been read, the whole subject will be open to discussion, and if at the close of the discussion I can offer any remarks of service in unravelling the question, I shall be happy to do so. I may, however, even now allude to discoveries in other countries of similar character to those made in England. I may for instance cite the discovery of the Abbé Bourgeois at Thenay near Pontlevoy, of implements to which he attributes a miocene age. There are also discoveries by Capellini in the neighbourhood of Sienna, of bones of a whale which he regards as having been cut by the hand of man. In this case there is a question as to whether the objects found are of pliocene age or of more recent date. There is also the discovery of the human

skull, "the Crano dell' Olmo," in a bed regarded as pliocene; but there appears to me to be a doubt as to the position of the skull, and, moreover, there appears to have been found with it a very fine flint lance-head which is probably neolithic. Then again, there is that interesting discovery at Wetzikon, in the neighbourhood of the lake of Zurich, described by Professors Rüttimeyer and Schwendener. In this instance what are regarded as cut staves of wood, and others with shavings twisted round them, have been found in lignite presumably belonging to an interglacial period in Switzerland. Then again there are the quartzite implements which have been discovered in the lateritic deposits of Madras.

In these discoveries the whole question turns upon the geological age of the deposits, and all are fair elements in the case to be brought forward this evening. There is but little doubt that inasmuch as the human race had, in a climate such as that of Britain in quaternary times, been able to subsist, to fabricate such implements as we now find, and even to have attained no moderate skill in the art of sculpture, they may have been colonists or wanderers from the original stock whose home was under a more favoured clime.

There is little doubt also, that of these earlier members of the human race, remains will eventually be found. In the meantime each successive discovery or even presumed discovery must be received in a cautious, thought candid spirit, even if eventually we have to carry it to what is called in the City a "suspense account;" but looking to the many sources of doubt and error which attach to isolated discoveries, I cannot but think that our watchword must for the present be "caution, caution, caution."

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The following papers were then read by the authors:—

*On the EVIDENCE AFFORDED BY THE CAVES OF GREAT BRITAIN AS TO THE ANTIQUITY OF MAN.* By Professor BOYD DAWKINS, M.A., F.R.S. F.G.S., F.S.A.

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- II.—Nature of Evidence. The Caves of Creswell.
- III.—Mixed Fauna universal in British Bone Caves.
- IV.—Mixed Fauna cannot be accounted for by Glacial *Æons*.
- V.—Mixed Fauna can be accounted for by Seasonal-Migration Hypothesis.
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- VIII.—Relation of Pleistocene Species to Glacial Age.
- IX.—Arctic and Temperate Species both Pre- and Post-Glacial.
- X.—Some Caves have been inhabited by Man in Post-Glacial Times.
- XI.—Evidence of Victoria Cave as to relation of Man to Glacial period unsatisfactory.
- XII.—Some Palæolithic Caves probably older than Post-Glacial Times.
- XIII.—Alleged proof that Palæolithic Man is not Post-Glacial founded on Southern Forms and distribution of Species.
- XIV.—Glacial Phenomena no guide to Age in Non-Glaciated Districts.
- XV.—Palæolithic Man of Caves of Late Pleistocene Age, Post-Glacial, and possibly Pre-Glacial as well as Glacial.

### I. INTRODUCTION.

It falls to my lot this evening to open the discussion on the antiquity of man, by bringing forward the evidence offered by the discoveries in pleistocene caves in Britain. It has been recently argued that all palæolithic deposits both in caves and river-beds are of pre- and inter-glacial age, or in other words, date back to an antiquity vastly more remote than that post-glacial period to which they have been referred by Lyell, Prestwich, Evans, and others.

The argument is based on the mammalia, their distribution, and on those conditions of life which are said to be inconsistent with those of post-glacial times. This I propose to examine so far as relates to the cave-fauna, leaving that of the river-beds, and which may be dealt with by physical evidence, in far abler hands.

Before, however, dealing with the subject, I would say that the antiquity of man is one which is not to be measured by the system of chronology used by the historian, but by the sequence of those physical and biological changes which are so familiar to the geologist.

Beyond the historical record, past time can not be estimated in terms of years, because we do not know the length either of the interval separating any two events, or of the time necessary for the changes which mark the hour—to use a metaphor—on the geological dial.

### II. NATURE OF EVIDENCE. THE CAVES OF CRESWELL.

The nature of the evidence offered by the bone-caves may be best estimated by taking a particular case. I shall, therefore, take as a type of palæolithic caves in Great Britain, those of Creswell Crags, which have recently been brought before the Geological Society by the Rev. J. M. Mello and myself, not



merely because they were the last explored, but because, in many respects, they offer evidence of singular value.

The well-wooded crags of Creswell rise on either side of a small lake, and are penetrated by a series of horizontal caves, two of which, the Robin Hood and the Church Hole, furnished palæolithic implements, in strata which were arranged in the same order in both. On the rocky floor a layer of light coloured sand, without fossils, the result of the decomposition of the rock below, formed the base of the lower ossiferous strata, which consisted of red sand and clay, averaging about 3 feet in thickness, and containing numerous stones and fragments of fossil bones and teeth. These were all scored and marked by teeth, in such a manner as leaves no doubt that the animals had fallen a prey to hyænas, and been dragged off to be eaten piecemeal in their dens. They were scattered irregularly through the sand and clay, which was the result of the flooding of the caves from time to time, when the stream flowed past their entrances at a slightly lower level, instead of some 20 feet below, as the present stream would do were it not formed into an artificial lake. They belong to the following animals:—

Lion.  
Spotted Hyæna.  
Fox.  
Wolf.  
Bear.  
Reindeer.

Irish Elk.  
Bison.  
Horse.  
Rhinoceros.  
Mammoth.  
Hare.

To this list must be added Man, who left behind him a few rounded quartzite pebbles and flakes of quartzite, of the rudest and roughest sort. The whole group points out that savages of a low order visited the district from time to time following the chase, that they drove out the normal inhabitants, the hyænas, which returned, however, to their dens after he went away. In this manner the intimate association of the implements and the fragments left by the hyænas, may be satisfactorily explained.

Above the red sand there was a fine red loam, the upper part of which was in some places represented by a limestone breccia. Throughout these numerous fragments of bone, some gnawed by hyænas, others broken and scratched by man, were associated with charcoal and burnt bone, and implements of quartzite, flint, and ironstone, of types well known in this country and on the continent. Some of those of quartzite and ironstone were of precisely the same form as those from the river-gravels of Brandon, Bedford, and Hoxne. They are identical with those found in France, from St. Acheul, near

Amiens, as far south as the district round Toulouse, and always in association with mammoth, reindeer, and woolly rhinoceros. Implements of flint were very numerous, flakes, scrapers, lance-heads like those of Solutré, awls or borers, and the like. There were also bone awls, a well-finished bone needle, variously cut and notched bones and cylindrical rods of antlers. And lastly, the incised figure of a horse, drawn with remarkable spirit upon a rounded and polished fragment of rib, of the same type as those found in the caves of France and Switzerland.

The animals associated with these remains are the following:—

Machairodus.	Reindeer.
Lion.	Irish Elk.
Wild Cat.	Bison.
Leopard.	Horse.
Spotted Hyæna.	Woolly Rhinoceros.
Fox.	Mammoth.
Wolf.	Hare.
Bear.	

Above the strata containing these remains was a layer of stalagmite ranging from 1 foot to a few inches in thickness.

From the distribution of the implements in these strata, it was evident that the human occupation consisted of three distinct stages. The few rude and rough implements in the red sand imply the use only of quartzite. During the time of the deposition of the lower part of the red loam, man used quartzite and flint, the latter of which, according to Mr. Binney, is to be met with within a distance of 40 miles. While the breccia and the upper cave earth were being accumulated the implements and weapons were fashioned out of flints, although quartzite was still used for hammer-stones. To this stage belong the figure of the horse, the most elaborately-worked flint implements, and the greater part, if not all, of the implements of bone and antler.

A sequence of palæolithic remains of this sort has not, so far as I know, been obtained from any other bone-cave either in this country or on the continent. To my mind at least it implies a distinct progress in the arts among the cave-dwellers, while the fauna above-mentioned remained on the whole without change. In Kent's Hole also, the implements found in the breccia at the bottom are of a ruder form than those which have been met with in the cave-earth above.

### III. MIXED FAUNA UNIVERSAL IN BRITISH BONE CAVES.

In the list of mammalia given above, it will be observed that there is a mixture of species, some of which are extinct, such as

the mammoth, the woolly rhinoceros and Irish elk. Others are now living in temperate climates, such as the horse and bison; others in hot countries, such as the spotted hyæna and the lion; while one, the reindeer, which is very abundant, is now only living in the cold region of the north. This mixed fauna is one which is to be met with universally in the bone-caves of this country, and with one exception, that of Baume in the Jura, in those also of France, Germany, Switzerland and Belgium.

In some caves in this country, such as Kirkdale, Victoria and Raygill, in Yorkshire, and in those of Cefn near St. Asaph, and in those of the Mendip Hills, we find the hippopotamus associated with the remains of the above-mentioned species, while in others we meet with northern forms, such as the lemming, lagomys, arctic fox, and glutton, in like association. In the caves of Auvergne, Professor Lartet detected musk sheep along with the same forms, an arctic animal found in this country in the river strata along with the mixed fauna above-mentioned. The species composing this mixed fauna occur in the caves of Britain in the closest possible relation to each other. In none do we find the southern group of animals in one situation and the northern in another; but they are found mingled together either just as they were left by the hyænas or by palæolithic man, or as they were introduced by a stream, or by the falling in of animals into swallow holes, as the case may be.

On this point the experience of Buckland and Falconer is amply confirmed by my own. Nor is the reputed case of the Victoria Cave an exception, in which a southern fauna with hyæna, rhinoceros, and hippopotamus is stated by Mr. Tidde-man to be met with below the horizon of reindeer. While the exploration was under my charge, the reindeer was determined from the stratum in question, in 1872, and published in the British Association Report for that year, which apparently has been overlooked in the succeeding reports. It is not to be seen in the collection from the cave in the Giggleswick Grammar School. The same intimate association of northern and southern forms is observable in a large number of river-strata, as may be seen by my lists published in 1869 ("Quarterly Journal Geological Society," p. 199).

#### IV. THIS MIXED FAUNA CANNOT BE ACCOUNTED FOR BY GLACIAL ÆONS.

How can we account for this remarkable association of animals? The question relates directly, as will be seen in the sequel, to the age of palæolithic man. Is it to be explained by the hypothesis of Messrs. James Geikie, Croll and others, that the southern

animals inhabited Britain in a warm inter-glacial period, while the northern forms were here at another time after an interval of 5,000 (Geikie, "Ice Age," 2nd edit., p. 523), or of 12,000 (Croll, "Climate, and Time") years, or a glacial æon; and that the strata containing their respective suites of remains have afterwards been mixed up together? This conclusion is negatived by the fact that there is not the least mineral difference to be observed between the remains of the southern and northern forms. Were it true, surely some one of the numerous British bone-caves would offer us some fragments of the undisturbed strata necessary to the hypothesis. When we are asked further to apply this explanation, not merely to the caves but to the river-strata, it seems to me that we are asked to believe more than we can reasonably be expected to believe without having some proof of the existence of the undisturbed strata in question with separate suites of animals. "De non apparentibus et non existentibus eadem est ratio." In the case of one animal, however, the spotted hyæna, the co-existence of which in Britain with the reindeer, is considered by Mr. James Geikie an impossibility (p. 512), we have full proof that northern and southern species lived in Britain at the same point of time. In twenty-eight out of thirty-one ossiferous caverns the two are found side by side, and in the great majority of these the gnawed bones and antlers of the reindeer show that that animal was the common food of the hyæna.

The fact that the southern and northern forms are associated together, not in one, but in all the British bone-caves, seems to me to be fatal to the view of migrations, at widely separated intervals of time, a view which is unsupported by any of the numerous discoveries in caves on the continent north of the Alps and Pyrenees.

#### V. MIXED FAUNAS MAY BE EXPLAINED BY THE SEASONAL-MIGRATION HYPOTHESIS.

The intimate association of northern and southern forms in the caves and in the great majority of river deposits, may reasonably be accounted for by the seasonal-migration hypothesis held by Lyell, and worked out in detail in my treatise on "Cave Hunting," by the overlapping of northern and southern faunas, according to the ever-varying summer heat and winter cold, over what was then a vast continent extending from Northern Africa to the hundred-fathom line off the coasts of Ireland and Scotland. In the summer the lion, Caffir cat, spotted hyæna, and hippopotamus would advance northwards; in the winter, the reindeer, musk sheep, lemming, tailless hare, glutton, and arctic fox would swing southwards.

If reference be made to my map of the distribution of pleistocene mammalia over Europe ("Quarterly Journal Geological Society," 1872, p. 436), it will be seen that Europe is divided into three zones; (1) that north of a line passing eastwards from Yorkshire in the direction of Hamburg, in which no southern forms are met with; (2) that south of the above line, and ranging as far as the Alps and Pyrenees, in which the faunas are mixed; (3) and lastly, that to the south of the above mountains, in which no northern forms occur. The middle zone then is the debatable ground between the northern and southern faunas, and every inch of it was probably contested not once but many times, according to the many and little-understood changes in the climate during the long period in which the pleistocene faunas had possession of Europe. The evidence seems to me to prove that the zoological provinces respectively of the reindeer and of the hyæna and hippopotamus were throughout this period contiguous, but that the position was continually shifting as the climate changed.

#### VI. PALÆOLITHIC MAN OF CAVES BELONGS TO NORTHERN GROUP OF ANIMALS.

With which of these faunas are we to associate the palæolithic man of the British caves, with the northern or the southern? The answer is no uncertain one. On the one hand, we find that the remains of the reindeer are found in every cave in this country, and on the continent north of the Alps and Pyrenees, in which palæolithic remains have been recorded. They are so abundant in those of central France, as to have given rise to the term, "the reindeer period." On the other hand, the only case on record of palæolithic implements being found in a cave, side by side with hippopotamus, is in that at Pont Newydd (Cefn), about 3 miles from St. Asaph. They are invariably associated with reindeer, and casually with the hippopotamus, *Elephas antiquus*, *Rhinoceros hemitæchus*, and the other southern species in the mixed fauna of the middle zone.

#### VII. PALÆOLITHIC MAN OF LATE PLEISTOCENE AGE.

At what time then in the pleistocene age did the reindeer invade the area under consideration?

The pleistocene fauna, as I have shown in another place, may be divided into three groups:—

1. The early pleistocene, represented mainly by the fauna of the forest-bed of Norfolk, and characterised by the presence of most of the temperate fauna of the cave and river-bed, of animals such as beaver, stag, roe, Irish elk. The *cervideæ* principally



belong to the tropical fauna of the *axis* and *rusa* types, which are survivals from the pliocene age. No northern mammalia are present.

2. The middle pleistocene, represented by the brick-earths of Erith, Crayford, Ilford, and Grays Thurrock in the lower Thames, and the deposit at Clacton. Deer of the *axis* and *rusa* type are absent; *Rhinoceros megarhinus* is present; *Elephas meridionalis* and *Rhinoceros etruscus* had retreated to the south. The stag, elk, roe, fallow-deer (*Var Cervus Brownei*), bison and urus are among the more important of the even-toed ruminants.

3. The late pleistocene, characterised by the true arctic mammalia, the reindeer, musk sheep, and others being the chief inhabitants of the middle zone.

It is obvious that the palæolithic men of the caves belong to the least of these three divisions.

#### VIII. RELATIONS OF PLEISTOCENE SPECIES TO GLACIAL AGE.

The cause of these changes in the pleistocene fauna is to be sought in the lowering of temperature in the north, which culminated in the ice-sheet, or confluent glaciers of the glacial period. As the ice crept southwards it would push the animals southwards also. First the temperate group appeared among the pliocene survivals, and the arctic group was pushed as far as the Alps and Pyrenees and the shores of the Mediterranean. When the temperature rose, and the ice retreated to the north, or to the top of the higher mountains, the arctic group retreated also.

#### IX. ARCTIC AND TEMPERATE SPECIES, PRE- AND POST-GLACIAL.

On this view, the temperate and the arctic pleistocene species must have invaded Britain, fleeing before the advance of the ice, and following up its retreat; in other words, must have been pre- and post-glacial. Proof of this is offered on the one hand by the forest-bed fauna of Norfolk, and by the mammoths and reindeer found in the Scotch drifts, and on the other, by the animals found in the river-gravels, which are later than the boulder-clays of Bedfordshire and Essex, and which extend with scarcely a break through the non-glaciated areas of the continent to the southern limit of the middle zone.

#### X. SOME CAVES HAVE BEEN INHABITED BY MAN IN POST-GLACIAL TIMES.

It is obvious therefore that it is impossible to infer either the pre- or post-glacial age of man from a consideration of the



mammalia associated with palæolithic implements, apart from physical evidence in each particular case. Evidence of this kind is to be seen in the Pont Newydd Cave already alluded to, in which palæolithic implements are associated with remains of hyæna, bear, reindeer, *Rhinoceros hemitechus* and *Elephas antiquus*. *dionalis* and *Rhinoceros Etruscus* had retreated to the South, &c.

The strata in which these are found are composed of materials derived from the sands and gravels of the middle drift, which underlies the upper boulder-clay of the surrounding districts, and occupies large tracts in Cheshire and Lancashire. This point is proved by the discovery of felstones in the lower strata, to which Professor Hughes called my attention last Easter.

It is therefore certain that here we have proof of the cave having been filled after the deposition of the "middle drift;" and since man and the animals found in it could not have inhabited the district while the upper boulder-clay was being accumulated upon it, we may conclude that they were in Denbighshire after the deposition of the upper boulder-clay, or in other words, that they are post-glacial.

#### XI. EVIDENCE OF THE VICTORIA CAVE AS TO RELATION OF MAN TO GLACIAL PERIOD UNSATISFACTORY.

The Victoria Cave adds nothing to the evidence or to the relation of palæolithic man to the glacial period, since the small fragment of fibula, what is taken by Mr. Tiddeman to prove that "the Cavern savage lived before the great-ice sheet, and before the great submergence," is considered by Professor Busk to be doubtful, and insufficient to be a basis for any such conclusion. I believe it to be ursine, on grounds which were recently brought before the Geological Society. Were it human, it may be remarked that the relation of the deposit in which it was found to the glacial age is a matter of dispute, on which opinions are about evenly balanced.

#### XII. SOME PALÆOLITHIC CAVES PROBABLY OLDER THAN POST-GLACIAL TIMES.

It does not however follow that because Pont Newydd Cave was probably inhabited by reindeer after the glacial period, that all palæolithic caves are post-glacial. While the ice crowned the higher hills of Wales and Northern Britain, caves and caverns further to the south, such as Kent's Hole and Brixham and those of the Mendip Hills, may have sheltered the palæolithic hunter. And even during the maximum development of the ice-

sheet over Northern Europe, man may have hunted, and probably did hunt, the reindeer in Aquitaine and Provence. There he may have been, to use the nomenclature of the glacialists, pre-inter- and post-glacial.

### XIII. ALLEGED PROOF THAT PALÆOLITHIC MAN IS NOT POST-GLACIAL, FOUNDED ON SOUTHERN FORMS AND DISTRIBUTION OF SPECIES.

It remains now to examine the alleged proof that palæolithic man is not post-glacial, advanced by Mr. James Geikie.\* The argument is founded on the assumption, first, that the hyæna, lion, and hippopotamus associated with him could not by any possibility have lived in the same area with the reindeer and other northern creatures, be the seasonal extremes what they may, and that therefore they lived here at a warm period, of which there is no evidence after the glacial age; and that therefore this period is pre-glacial, coincident with an inter-glacial æon.

"By slow degrees," he writes, "the cold of winter (glacial) abated, while the heat of summer increased. As the warmth of summer waxed the arctic mammalia gradually disappeared from our valleys, and sought out northern and more congenial homes. Step by step the climate continued to grow milder, and the difference between the seasons to be less distinctly marked, until eventually something like perpetual summer reigned in Britain. Then it was that the hippopotamus wallowed in our rivers, and the elephant crashed through our forests; then, too, the lion, the tiger, and hyæna became denizens of the English caves;"\*

"Such scenes as these continued for a long time. But again the climate began to change. The summers were less genial, the winters more severe. Gradually the southern mammalia disappeared and were succeeded by arctic animals. Even these, however, as the temperature became more severe, migrated southward, until all life deserted Britain, and snow and ice were left in undisputed possession. Once more the confluent glaciers overflowed the land, and desolation and sterility were everywhere!"\*

By a similar method as that by which the perpetual summer is inferred, by a judicious selection of animals from among the cave-fauna, a perpetual winter may be argued for the reindeer, musk-sheep, and the like, or a temperate climate from the

\* "Ice Age;" 2nd edit., p. 562. The tiger has not yet been found in Europe.

stag, bison, horse, and most of the wild animals now living in Britain. And when we add further, the fact that palæolithic remains in the caves north of the Alps and Pyrenees, are invariably associated with the reindeer, and that that animal supplied the men of the caves with food and materials for implements, it will be seen that the perpetual summer hypothesis is untenable. I know of no facts, either physical or biological, in support of any warm climate in central and northern Europe since the disappearance of the deer of the types of *Axis* and *Rusa*, and the antelopes of the pleistocene.

The distribution also of the mammalia is urged in support of the view that palæolithic man is not of post-glacial age, and therefore either inter- or pre-glacial. There are certain areas in Britain in which the marks of recent glaciation are the freshest, and in which the fauna of the caves and river-beds is conspicuous by its absence. This is taken to prove that originally the animal remains were distributed alike over the mountains of Wales, Scotland and Cumberland, and the high grounds of the North generally, and that they have been removed from those areas by the extension of the ice. The view which I advanced in 1871 ("Popular Science Review" and "Cave Hunting," 1874) still seems to me a better explanation of the facts, that the non-glacial lowlands were inhabited by the animals, *while* the ice covered the glaciated areas, in the second ice, or glacier period.

#### XIV. GLACIAL PHENOMENA NO GUIDE TO AGE IN NON-GLACIAL DISTRICTS.

The physical changes of the glacial period are so little understood even in such a limited area as Britain, that they are a fertile subject for discussion among geologists. Even if they were thoroughly mastered, it seems to me that they would offer no means of testing the age of palæolithic man in non-glaciated areas, or those in which the majority of the ossiferous caves and river-strata are to be found. The glacial period further, is not a hard and fast line dividing one fauna from another. The classification by means of ice is one thing, and the classification by means of animals is quite a different thing.

#### XV. THE PALÆOLITHIC MAN OF CAVES OF LATE PLEISTOCENE AGE POST-GLACIAL, AND POSSIBLY OLDER.

In these remarks, I have approached the subject of the antiquity of man from the stand-point offered by zoology, and by the principles of homotaxy. According to the evidence of the associated mammalia, the palæolithic man of the caves belongs

to the late stage of the pleistocene, when the arctic animals were present in this country and on the continent in full force. He may have been in Europe before, and while the ice covered large tracts of land in this country, North Germany and Scandinavia, or in pre-glacial and glacial times, and he was an inhabitant of the Denbighshire caves after the ice of the second ice-period had passed away from that region.

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*On the EVIDENCE AFFORDED by the GRAVELS and BRICK-EARTH.*  
By PROF. T. MCKENNY HUGHES, M.A.

PROF. HUGHES said: I will confine my remarks to the East Anglian district, in which it has been stated that evidence of the existence of man before the close of the glacial period has recently been found. I have no reason to doubt the finding of the implements in the beds from which they are said to have been procured. Their occurrence in the section near Brandon has long been known, and also in many similar deposits throughout East Anglia. The only point that is new, is the assertion that these beds are of glacial age.

The question is entirely geological, and must be answered by an appeal to sections. I will endeavour to explain these in such a way that any one who wishes to go into the details may readily find the important points.

I shall use the word glacial in a wide sense, so as to include everything, from the beginning to the end of the last time, when conditions of extreme cold prevailed *in the area in question, or in adjoining areas so situated that by supplying ice, or influencing the climate they must have directly and greatly affected the area in question.* I avoid entering into the controversy as to whether there were one or more periods of extreme cold in late geological times, and also whether man may not have lived in France or Africa or a lost land in the Indian Ocean, while glacial conditions prevailed in Britain, just as man now lives in North Britain and Norway, while glacial conditions prevail in the interior and off the coasts of Labrador and Greenland.

We have in East Anglia deposits of post-tertiary age which for our present inquiry may be conveniently grouped under two heads.

*B.* The older, consisting of (1) an irregular lower boulder-clay succeeded by (2) stratified sands and gravels with subordinate loam or boulder-clay, and (3) an upper boulder-clay.

*A.* The newer deposits, being the products of the denudation by sea, rivers, rain, &c., of the above, and of any still older beds exposed. The beds belonging to the older series *B*, which occur in

the area of which I propose to speak, are to be referred chiefly to the middle group (2), which, to avoid repetition, I may speak of as the Hatfield Beds (probably the equivalents of the Middle Glacial of Searles Wood), and well seen in the railway cuttings north of Hatfield and elsewhere in that neighbourhood.

They may be traced from Hatfield, over the chalk spur by Welwyn, by Hertford and Ware (see "Quarterly Journal Geological Society," August, 1868) into the valley by Parndon and Harlow. They are seen at intervals, *e.g.*, by Saffron Walden, Chesterford, Whittesford, &c., assuming, as they go north, more and more of the character they have in the Brandon and Thetford districts.

It is obvious that these deposits partially filled the valleys and hollows, and that since their emergence, extensive valleys have been scooped out through them, generally along the old lines.

The earlier products of this denudation are of course of very great antiquity, and to them I would refer all the beds in East Anglia in which flint implements have been found.

Loams occur at various horizons in the older series *B*, and loams of various age and origin, are found in the newer series *A*. These loams are generally all so much alike, that it would be quite impossible to identify them with any certainty in separate sections by their lithological character alone.

Moreover, where an overlying loam is derived from an immediately underlying loam, it is often impossible to draw any line between them in one section, especially if the section is so small that the discordant overlap cannot be made out.

Even in chalk, the *remanié* top part cannot be distinguished from the somewhat weathered lower part, except where surface flints are found embedded. How much less can we expect to distinguish the resorted from the undisturbed material in the case of loam? Fortunately, however, most of the sections appealed to for evidence of the glacial or inter-glacial age of man in East Anglia are of considerable extent, and owing to various happy circumstances tolerably clear.

I will now give my interpretation of them. In the large pit at the new Waterworks for Thetford, there is a loam on blue clay, which rests on a loam similar to that above, and below this. boulder-clay has been proved to 60 feet. All these I refer to *B*. In the adjoining pits it can be seen that a newer loam, sand and gravel rests irregularly now on one, now on the other of the above-mentioned beds. These I refer to *A*.

In an old pit, north of Thetford Station, gravel (*A*) may be seen resting irregularly on blue gault-like clay (*B*). In a large pit north-east of Thetford Station there is a section about 32 feet deep, in which the upper loam, sand and gravel (*A*), is seen resting irregularly on boulder-clay (*B*), which is here often



composed almost entirely of chalk. At the base of the troughs and pans of the upper loam, &c. (*A*), there are generally lines of sifted or sorted material, such as, *e.g.*, sometimes a bed which seems derived almost entirely from the Kimmeridge clay, or from the Neocomian. The different specific gravity of the material would probably be sufficient to explain such washing together of different material out of the drift to various positions in the channel.

In the Culford brick pit (near West Stow, Bury St. Edmunds), boulder-clay is seen resting on buff loam, with often a bed of sand to 3 feet in thickness between the clay and the loam. There was not much evidence, but it seemed to me that all the deposits in this section should be referred to the lower series (*B*). So far, I have given sections in which any one may see what I mean by the series *A* and *B*.

Looking from Culford, across the alluvium of a small tributary of the Lark, and above the obvious terrace of gravel at the base of the hills on the other side, we see far up the slope traces of an obscure terrace, becoming more and more clear and well defined as we follow it to the left towards Icklingham. Near the farm at the Icklingham end, there is a deep pit in brick-earth, with pupa, pisidium, bones and antlers. In the upper loams (*A*), all along this terrace, pupa and pisidium are not uncommon. I am not aware that they have ever been found in the underlying series (*B*). Underneath the brick-earth, and exposed at the surface in a pit a little nearer the Beeches Pit, is a bed of gravel just like any ordinary gravel along the river terraces of that district, or of the Thames or the Somme. Further on, where the terrace is almost obliterated, the Beeches Pit occurs. In this pit there is a yellowish loamy boulder-clay (*B*), and in distinct and well-defined hollows in this boulder-clay, a series of loams, sands and gravels (*A*), at the base of which occur bands coloured by black and red oxides of iron and manganese, in which I saw bones and antlers, and in which the flint implements are said to have been found. Patches of rainwash (or head or run of the hill), derived from boulder-clay or chalk or loam, as the case might be, rest irregularly on either *A* or *B*. But no undisturbed boulder-clay overlies the implement-bearing bed.

The next section I shall refer to is that on Broomhill, at Botany Bay Brickworks, near Brandon, in which also flint implements have been found. The workman has been collecting for some time, but has never had a genuine specimen when I have visited the pit. He pointed out the exact position from which he had obtained them, which was in a band of clayey gravel coloured by oxides, and in all respects resembling that



which forms the lining of the troughs and hollows in the Beeches-Pit. It seems to be an old deposit, in the upper part of what is now a dry valley, which has been scooped out through a great mass of loam, boulder-clay, &c. (*B*), which had partly filled it. Implements are said to have been found also in the south corner of the same pit where the beds are let down in pipes, and somewhat contorted. Such contortions are often due to the removal of part of the calcareous matter of the chalky gravel or loam or the underlying chalk itself, and the consequent dropping in of the earthy residue and overlying beds. Some of the curves are apparent, not real contortions, being due to the alteration of colour by infiltrating water. But this section is not clear.

On the whole, the evidence goes to show that from the first emergence of land out of the glacial sea, sub-aërial and aqueous denudation have been working at it and cutting it down often along the lines of old pre-glacial valleys, leaving a river terrace here, a mass of rainwash or other talus there; estuarine silt in one place, pond-mud in another, and that man appeared on the scene early in this post-glacial period.

Before that emergence, icebergs and coast-ice carried their load south, and dropped it in the sea (witness the boulder-clays with shells or shore shingle or beds of sand). Sometimes the ice grounded (witness the great furrows and the contortions). Sometimes the sea sifted the material (witness the sorted and stratified gravel, and sand, and loam, and clay). Sometimes the ice dropped it as it got it (witness the boulder-clay with moraine-like masses). Even in the midst of such unfavourable conditions man may have been a not unfrequent visitor, as now, along the shores of arctic seas, but as a matter of fact, there is as yet no evidence that man was there.

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*On the AGE of the HYÆNA-BED at the VICTORIA CAVE, SETTLE, and its bearing on the ANTIQUITY OF MAN.* By R. H. TIDDEMAN, M.A., F.G.S., of H.M. Geological Survey.

It was lately remarked in a discussion at the Geological Society, arising upon Messrs. Mello and Dawkins' papers, on the Creswell Crag Caves, that the "whole matter" of the antiquity of man, so far as the the Victoria Cave bore evidence, resolved itself into a very small point. The speaker, Dr. Murie, went on to state, that "he had examined a certain bone from the cave, hitherto supposed to be a human fibula, and in his opinion it might be almost any bone, and that all ideas of the habits of the

cave-dwellers founded upon it were therefore mere fictions." This second remark may be considered superfluous, for no such ideas founded upon it have, I believe, made their way into any scientific works or periodicals. Without at all calling in question Dr. Murie's skill and judgment, we may remark that the latest expressed opinion is not, *ipso facto*, the most correct, and it will remain to be seen whether it will have greater weight than the previously expressed opinions to the contrary, by Professor Busk, Mr. James Flower, Professor Rupert Jones, and others.

Be this as it may, the chief value of the Victoria Cave lies in the opportunity which it gives of correlating the ancient faunas contained in it, and which are *elsewhere* associated with the bones or handiwork of man, with certain great events in geological time. But supposing that the fibula cannot be regarded as a certain proof of man's presence in that district at the time when the hyæna-bed was being formed, we have not yet come to the end of the evidence bearing on this particular point; objects bearing marks made by man are as good proofs of man's presence as his own bones.

On the 10th of June, 1875, when the Rev. Mr. Crosskey and I were at the cave, a small bone turned up bearing upon it marks which cannot be considered to have been made by other than human agency. It lay in 2-foot parallel 1, under the datum-line, from which the position of the "finds" is measured, and at a depth in the deposits of 25 feet from the original surface.\* It is about  $2\frac{1}{2}$  inches of the dorsal end of a rib, but the articulating surfaces are broken off. There are at least nine transverse nicks, with others less distinct; joining them obliquely, and one longitudinal nick near the head. They appear to have been made by some clumsy instrument drawn backwards and forwards. They are quite unlike the gnawings of either rodents or carnivores. Professor Busk considers the bone to belong to a small ruminant.

About eleven months later, on the 2nd of May, 1876, another bone, a small humerus,† was found bearing very evident tool-marks. It occurred in parallel 17, at 17 feet right of the datum-line, at a depth of 15 feet. The marks are very clean cuts as if made by a sharp instrument, so sharp indeed as almost to suggest that they may have been done with a metallic tool. The cuts however are evidently not made subsequently to the discovery of the bone, for the surfaces therein exposed are of the same colour and have the same dark and ochreous staining and incrustation as the general surface of the bone. Its occurrence,

\* Its register number is 185.

† Register number 36.

however, at the depth of 15 feet, in the hyæna-bed, and surrounded by bones and teeth of hyæna, bear, elephant, and rhinoceros, precludes us from assigning to it a modern origin in spite of the sharp nature of the cuts. It may be a question whether a sharp flint flake properly hafted may not be capable of producing in a bone of a freshly-slaughtered animal marks similar to these. In the absence of Professor Busk, I forwarded it to Mr. William Davies, of the British Museum, and he says the humerus "is that of a very small goat, but evidently of an adult. It is smaller than the humerus of a true Shetland sheep with which I compared it, and besides the narrower fossa which you refer to, there are other points in which it differs from the same bone in the sheep." Mr. Davies goes on to remark upon the good preservation of the bone, which leads him to think it must be of comparatively recent age. This, however, is a common condition in bones from the hyæna-layer.

On this point it may be well to remark that no fact has been more strongly brought out by the exploration, than that the condition of a bone is no test of its age; *cæteris paribus*, of course, a newer bone will be fresher than an older, but the nature of the matrix in which a bone is buried has a far greater influence over its destruction or preservation than the mere lapse of time; for this reason, that it may either, if permeable, expose it to destructive influences, or, on the other hand, if impermeable, entirely arrest decay. The bones of the Roman layer in the loose *débris* outside the cave are in a far worse condition than the greater part of the much older remains in the stiff clay of the hyæna-bed. Many bones from the stiff clays of the lias and oolites are better preserved than the bones of sheep which have been bleaching on the moors during the brief space of our own lifetime. These remarks are strikingly exemplified by different portions of a pair of reindeer antlers found scattered about the upper beds in the cave; some portions which had been exposed on the surface or imbedded in lighter material, had lost their outer coating and were very friable, whilst other fragments from a stiff clay were in good condition. To have assumed that their portions were of different ages would have been wholly wrong, and the fitting together of them undeniably proved it.\*

There is perhaps another objection which should be considered. It is commonly supposed that goats, with some other domesticated breeds, had not found their way into Britain during pleistocene times, and that they were subsequently imported for the first time by neolithic herdsmen. *A priori*, it does not seem impossible for goats to exist and even flourish outside the pale

\* See also "L'Homme pendant les Ages de la Pierre." Par M. E. Dupont, p. 197.

of civilisation. There can, I think, be scarcely any doubt that in the Victoria Cave remains of goat are not uncommon in the hyæna-bed associated with elephant, rhinoceros, hippopotamus, &c. The same fact has been observed by M. E. Dupont in many of the Belgian bone-caves.\* It seems therefore at least unreasonable to suppose that the goat was living on the continent in pleistocene times, with this ancient fauna, and yet did not accompany them to this part of the then continent, when they overspread it. Putting all these circumstances together, and regarding them as impartially as possible, it is by no means easy to escape the conclusion that we have in the Victoria Cave evidence of man's co-existence in the North of England with the ancient fauna already mentioned. This is a fact which the cave holds only in common with other caves, and in itself would be of comparatively little importance, did not the possibility arise of correlating the existence of these early congeners of man with the occurrence of widespread physical changes.

It is my intention now to treat of this question. In doing so I shall confine myself to the broad outlines of geological knowledge bearing on the matter. It would be out of place to bring before this Society the minuter details, ascertained in the excavation of the cave and carefully noted from time to time. These have already appeared in summary in the British Association Reports, and prove without room for doubt that the hyæna-bed in the cave has glacial deposits resting upon it, and therefore is in a sense pre-glacial. Ingenious speculations have been brought forward by Professor T. McK. Hughes and others to show that under certain circumstances it is just possible that these glacial beds were not deposited where they have been found by glacial action; but none of these suggestions tally with all the facts recorded, and in seeking to lay what is a difficulty to some minds, they really raise others which are greater.

The older bone-bed, or hyæna-bed, in the Victoria Cave, contains amongst others, beside hyæna, the following, *Elephas antiquus*, *Rhinoceros*, *leptorhinus*, hippopotamus.† These constitute a well-marked fauna, about which no doubt is entertained by geologists that they are contemporary. They are found in old river-gravels, in France, in Switzerland, and in the South and East of England,

\* See also "L'Homme pendant les Ages de la Pierre." Par M. E. Dupont, *passim*. In a letter to the author, bearing date August 24, 1877, M. Dupont writes: "La chèvre de nos cavernes ne peut être distinguée de la chèvre ordinaire. Elle y est associée au Mammouth, au *Rhinocéros tichorhinus*, à l'*Ursus spelæus*, etc. J'en maintiens absolument la co-existence avec ces espèces perdues. Ces observations corroborent donc la vôtre, et je ne doute pas qu'elles ne soient constamment confirmées à l'avenir."

† The remaining species are not so accurately determinable, or, occurring as they do above as well as below the glacial drifts of the North-West of England, give no definite indications of time, and therefore cannot assist us in this inquiry.

and in each of these countries are associated with the remains of man or his works. In Belgium they occur in caves similarly associated.

The geologists who have worked chiefly in the South of England, and studied the superficial deposits there, maintain as a body, and I think rightly, that these remains are there post-glacial. But some go further, and do wrongly in assuming because they are post-glacial in the South of England, they must be so in the North. At first sight this appears almost an axiom, but further study will show that it is a great error, and I believe it is to this apparent discrepancy between the age of these deposits in the North and South of England, that much of the scepticism which has prevailed as to the pre- or inter-glacial age of man is owing. I must, therefore, beg permission to examine this matter, for there is really no need for such great differences between the opinions of the geologists of the South of England and those of the North. In the North our opinion that these animals are pre-glacial subjects us to the accusation of putting the cart before the horse. We may accept the metaphor and justify the deed. Horses usually in the South of England are put before the cart, and were I to say that in the North I have seen the horses harnessed to the backs of the carts, my statement would probably be received by some with derisive incredulity. The fact is none the less true, and when I state that in these cases there is a horse also in the shafts in front, the difficulty vanishes and the fact may be admitted. We have perhaps in the North drawn more attention to the horse behind the cart than to that in front, because its position is not so generally recognised. At the same time, we admit most fully that the shaft-horse of the South is an admirable and necessary institution, which we cannot dispense with in the North, though we reserve to ourselves the right to retain a horse also behind the cart (as a drag) when the steeper gradients of our hills and dales render its assistance indispensable.

To drop metaphor, we may admit that man as a contemporary of this particular fauna is in the South and East of England post-glacial, whereas in the North-West he is pre-glacial, and yet there is no contradiction in these two statements. We have, in short, evidence of two strongly-marked glacial periods, of which the earlier left its traces far down into the South of England, whereas the latter did not extend its icy fingers further south than the Midland Counties, probably not so far.\* This is by no

\* Mr. Searles Wood, junior, I believe, first expressed an opinion that the drifts of Scotland and the North of England were of later age than those of the Eastern Counties, but on somewhat different grounds. See *Geological Magazine*, vol. ix, p. 171, 1872.



means an easy thing to prove, for glacial deposits of one age are very similar to those of another; yet there is, I think, a clue to the difficulty.

In 1871 I had the honour of reading a paper to the Geological Society of London, in which I endeavoured to prove the former existence of a wide-spread ice-sheet in the North-West of England.\* The conclusion that I came to from the evidence which I had been collecting for some years, was that nearly the whole of that region south of the Lake District and west of the Pennine Chain had been covered with an extensive ice-sheet which had worked over the country in the main southward. The direction of the travelling of such a sheet was shown by the scratches on the rocks and the movements of materials, which appeared to have a general trend irrespective of all but the greatest physical features of the district.

The valuable papers of my colleagues, Mr. Dakyns,† which appeared at the same time, and Messrs. Ward,‡ and Goodchild,§ which came out subsequently, have demonstrated a similar state of things in the districts to the East, North, and North-East respectively, and further to the south the conclusions have been supported in the main by Professor Ramsay,|| Messrs. John Aitken,¶ and Thomas Tate,\*\* and have received the assent of most geologists.

If any be sceptical of these conclusions, let them at least consider what would be the effect of such a sheet of ice of the great thickness which it must necessarily have been, moving over the ground slowly but irresistibly. All previous surface-accumulations, such as soil, scree, or talus, older glacial drifts, and river-gravels would be removed from their position, ground up and worked up into glacial drift. The greater part of this would be carried long distances in the direction of the ice-flow. On a change from a cold to a more genial climate, as the ice

\* "On the Evidence for the Ice-Sheet in North Lancashire and adjacent parts of Yorkshire and Westmoreland." *Quarterly Journal Geological Society*, vol. xxviii, p. 471-191, 1872.

† "The Glacial Phenomena of the Yorkshire Uplands." *Quarterly Journal Geological Society*, vol. xxviii, p. 384, 1872.

‡ "The Glaciation of the Northern part of the Lake District." *Ibid.*, vol. xxix, p. 422, 1873.

§ "The Glacial Phenomena of the Eden Valley and the Western part of the Yorkshire Dale District." *Ibid.*, vol. xxxi, p. 55, 1875.

|| "Physical Geology and Geography of Great Britain." Third Edition, p. 161, 1872. Also, "How Anglesey became an Island." *Quarterly Journal Geological Society*, vol. xxxii, p. 119, 1876.

¶ "On the Unequal Distribution of Drift on opposite sides of the Pennine Chain." *Ibid.*, vol. xxxii, p. 184, 1876.

\*\* "The Glacial Deposits of the Bradford Basin." *Proceedings Geological and Polytechnic Society of the West Riding of Yorkshire; New Series*, part ii, p. 101.



slowly receded, it would leave the solid rocks bare of all previous drifts, covered only by the mud and boulders and rubbish melting out of it, which itself had made, and the coarse gravels formed by the streams flowing out of the ends of the glaciers in their slow retreat. And in thus losing all earlier surface-accumulations, we should also certainly lose all traces in the open country of all its former inhabitants, whether man or beast.\* Flint implements would disappear, if they had existed, equally with the less durable remains of man. Only in the shelter of caves or rock fissures would there be a chance of any traces of the older inhabitants remaining. And just this state of things which should result if an ice-sheet had passed over a portion of the country, is precisely what we do find in the North-West of England.

Professor Boyd Dawkins, I believe, first called attention to the fact that those areas in Great Britain in which the marks of glaciers were the freshest and most abundant, coincided with those which were barren of the remains of the pleistocene mammalia, and inferred in the then state of our knowledge that the areas in question were covered by ice *at the time* that pleistocene animals were so numerous in the caves and river deposits of Southern and Eastern England.†

The subsequent discovery of the hyæna-bed and its contents at Settle, and still later the finding of the same fauna in an old river-gravel overlain by glacial deposits in a cave in Lothersdale near Skipton, both in well-glaciated districts, showed that these animals had existed there before the last *great* glaciation. Had they existed in that country after it, we could not fail to have found their remains somewhere in the river-gravels of that district, which must have been at one time as fully occupied by them as the South of England, where they are now found so abundantly in the river-gravels.‡

Our ice-sheet of the Northern Counties could not spread south for ever, and must have had a limit somewhere, and we find evidence of that limit in districts which bear no distinct traces of glaciation. The high country of the peak and the Mountain Limestone of Derbyshire is free from those extensive sheets of glacial rubbish which occupy the country to the east, west, and north, of it as may be seen in the valuable drift-map by Professor A. H. Green, in the Geological Survey Memoir on that

\* First suggested by Professor T. F. Jamieson, on *à priori* grounds, in, I think, his paper, "History of the Last Geological Changes in Scotland." *Quarterly Journal Geological Society*, vol. xxi, pp. 161-203, 1866.

† "Popular Science Review," October, 1871.

‡ See remarks on this by the author, "Geological Magazine," vol. x, p. 11; *ibid.*, p. 140; "Nature," vol. ix, No. 210, p. 14.

county.\* The outlying patches of drift which do occur in it are probably the worn remnants of an old and earlier glaciation.

It seems likely that this district, and some other patches of high ground a little further north, were like the so-called islands forming the coast of Greenland, described by Dr. Robert Brown in his invaluable paper.† These are only insulated by the ice and separated from each other by the great broad tongues of ice which drain the universal sheet of the interior. He likens Greenland and its interior ice-field to a broad-lipped shallow vessel with chinks in the lips here and there, and the glaciers, like viscous matter, pouring out through them, the broad lips being the "islands."

The ice-sheet must have been melting away and thinning away considerably when at its maximum both to the west and east of the Derbyshire hills, and there is nothing unreasonable in supposing that such high ground may have been comparatively free from ice, whilst its sides were hugged by the broad sheet flowing from the Lake District and elsewhere, but thinning away to its final limit a little further south. Professor Dawkins' interesting discovery of rhinoceros in the screes or talus of the steep hill-sides near Castleton in the Peak District, is evidence that no ice-sheet or glacier has passed down that valley since that beast was feeding there; and in that fact the superficial deposits show their similarity to those of the south country and differ from the state of things existing in the well-glaciated region to the North. This occurrence, though at first sight exceptional, may really be regarded as a strong confirmation of this view.

To sum up, we may say that, even supposing we had never found traces of man in the Victoria Cave in the older pre-glacial beds, his great antiquity would be there fairly proved. A set of animals which are well known to have existed with man elsewhere, is there shown to have lived before an age of great land glaciation, and to have had its remains swept from that country by it. That ancient fauna lived in the South of England and the Eastern Counties upon a land-surface covered with the vestiges of a still older and more extensive glaciation, of which the traces have been swept away in the North by that later glaciation.‡ This glacial period, which I consider to

\* "The Geology of North Derbyshire and the adjoining Parts of Yorkshire," p. 134. See also on this subject the papers above cited, by Messrs. John Aitken and Thomas Tate.

† "On the Physics of Arctic Ice," *Quarterly Journal Geological Society*, vol. xxvi, p. 677, 1870.

‡ It is here unnecessary to enter into the question as to how much of the East Anglian drifts are submarine or sub-aërial. It does not much affect the matter with which we have to do, and may well be left to the eminent geologists who are studying that part of the kingdom.

have been later than man's introduction into Europe, would appear to be the same which spread the whole of Scotland and perhaps of Ireland, with a sheet or sheets of land-ice, and was succeeded in the North of England by a submergence whose utmost depth is disputed, but was not, in my opinion, greater than 400 or 500 feet.\*

These views are in the main what I have held for some years. They seem to me almost entirely to reconcile the facts which have been gleaned, and to harmonise many of the discordant opinions which have been held by geologists in all parts of the kingdom. The details, of course, require filling in, but the broad views thus roughly stated may claim at least to be founded upon facts.

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A letter from Mr. Whitley was read, and photographs of flint implements from Brixham Cavern were exhibited, and thanks voted to Mr. Whitley for the same.

The following letter from Dr. Nicolucci was read.

ISOLA DI LIRI,  
4th May, 1877.

MY DEAR FRIEND,—

I am grieved at not yet having made any communication to you upon the men of the caverns of Italy. I can assure you that the traces of troglodyte man are not rare in Italy. They have been met with in a grotto near Torino di Sangro, in others in the Valley of the Vibrata of Viletta, Barrea and of Cappadocia, in the Abruzzi, as well as in Mount Asperano, near Roccasecca, and at Cape Leuca (Pouilles). Of all these grottos which have been inhabited in the neolithic age, I possess in my collection almost all the objects met with in stone, in bone, and pottery.

Another grotto in the Island of Palmaria (in the Gulf of Spezia, Genoa) has been explored by Capellini and Regalia, and here have been met with, among the *débris* of animals, fragments of human remains and object of human industry of the stone age.

The grotto of Mount Tignoro, near Livourre, has furnished to the Marquis Strozzi two crania of the polished stone period. Others have also been given to the late Regnoli from the grotto of the Chateau on the mountains of Pita, and still others have been met with by the Curate Don Perrando Deo Gratias in the cavern

\* I am here referring to the "middle-sands and gravels" of Lancashire. I have for three years seen good reason for supposing that the undoubted marine deposits at much higher elevations, such as those of Moel Trefaen and Macclesfield, have really nothing to do with this, but are relics of an earlier submergence which survived the later glaciation of the North of England ice-sheet, but my reasons must be reserved for another occasion.

of the Matti near Perti, in the territory of Savona (Liguria). All these crania have been described briefly by myself in the report already published upon the Anthropological Exposition, and of Pre-historic Archaeology at the Congress of Bologna. ("L'Age de la Pierre dans les Provinces Napolitaines," Par M. Nicolucci.)

An important discovery is that which has been made by M. Issel of many skeletons in the grotto of Finale, in Liguria. These skeletons, which have unfortunately suffered many injuries in their transmission from Finale to Geneva, have not yet been studied. They are destined for the pre-historic museum at Rome, and I am engaged to go there to study them.

A complete cranium, with fragments of many others have lately come into my hands. It has been withdrawn from a grotto near Matera (Basilicata), in the same stratum which contained a great quantity of objects worked in flint, in bone, and in pottery.

If more precise descriptions of all these crania would interest the Anthropological Institute, I will endeavour to collect the different notices, and to communicate them in an express work addressed to the learned Society to which I have the honour to belong.

I do not doubt that the discussion which is to be opened on the 22nd of May, at the Anthropological Institute, upon the present state of the question of the antiquity of man, will be very important, and I shall read with the greatest interest the details of this discussion.

I have pleasure in repeating it that I am your very devoted,

GIUSTINIAN NICOLUCCI.

#### DISCUSSION.

Prof. BUSK wished to explain, before the discussion commenced, the circumstances connected with the interesting fragment of bone, for the determination of which he was personally responsible. This "bone of contention" was represented by the cast which he held in his hand. He was surprised that such a large superstructure had been raised upon that particular piece. It was merely a fragment, evidently of a fibula, one of the most variable bones in the body. It was received by him, together with a large collection of other remains, from Mr. Tiddeman, and for a long time remained an insoluble problem. At last, after many conjectural determinations by himself and others, Mr. James Flower, the well-known articulator to the Royal College of Surgeons, discovered in the College a human fibula of unusual size, and with which, as he pointed out, the Victoria Cave bone corresponded in many particulars. This determination, with the reasons for it, and illustrated by figures, was published in the *Journal* of the Institute. At the same time, Mr. Busk was per-

fectly open to be convinced that it might be ursine. But although Prof. Boyd Dawkins had been good enough to show him bones of fossil bears of surprising size, none of them quite came up to the one in question. Nor at Toulouse, where there is such an enormous collection of ursine remains, did Mr. Busk observe any of corresponding dimensions. He was himself still disposed to regard the specimen as a fragment of an abnormally large human fibula, but thought that at present it would be unsafe to build any strong conclusions upon it.

Professor ROLLESTON: I have been much impressed with the liability to disturbance of the fibula. Once in digging out a British skeleton, buried in the usual contracted fashion, before coming down to the skeleton we came upon a fibula standing vertically. When we came down to the skeleton, I cleared all the stone and earth away from it, and found that the fibula in question, instead of being a bone from some previously interred and removed body, was actually one of the fibula of the skeleton lying horizontally at the bottom of the grave. Yet it is easy to see how this bone is eminently liable, as the flesh round it and the ligaments binding it decay, to be acted upon as a lever by stones settling down upon it. Then its pointed ends favour its moving. So Professor Busk, writing (Congress of Pre-Historic Archæology, 1868, p. 152) of the Genista cave at Gibraltar, says, "There were about thirty thigh bones, and eighteen to twenty tibia, but strange to say, portions of only three *fibulae* were observed."

As regards the judging of climate from the presence of mammals, I rather disbelieve in it. The reindeer lived in Germany in the time of Julius Cæsar, and was spoken of by him as *bos cervi figura*, as the Canadian reindeer is called "Carriboo" (*Cerfbœuf*) now. The hippopotamus and rhinoceros have been supposed to indicate warmth of climate, but they appeared to me to stand the late wretched weather in the Zoological Gardens at least as well as most smaller animals. Why should they not? The power of resisting cold and generating heat depends on bulk, and bulk increases as the cube of the linear dimensions. But Schrenk, in his excellent work on "Amoorland," 1858, tells us that the tiger, an animal connected, however wrongly, with notions of tropical heat, was to be found in the island of Saghalin, which was in the cold weather connected by a bridge of ice with the mainland; and that its food there was not the buffalo nor the roe, but the reindeer. The roe was not found in Saghalin, not on account of the cold, but on account of quite another reason, the presence of pinewoods at the point of crossing from the mainland over to the island. This shows how much care is required in arguing to the presence of climatic or other inorganic condition from the presence or absence of particular animals. Reptiles are more surely indicative of temperature than most other animals; non-metabolous insects again than insects with perfect quiescence as *pupæ* to protect them during winter, but vegetable life was a surer guide as a whole than animal.



Professor PRESTWICH: You, Sir, have justly observed that to consider this question thoroughly requires the knowledge of the palæontologist, the archæologist, the anthropologist, and the geologist. I think it especially concerns the geologist in regard to the sequence of events. Palæontologists have been rather apt to overlook the geological conditions under which these specimens are found. We have to deal with the sequence of man from his first appearance in time geologically to that period when it comes within the range of ethnological inquiry. I will confine myself to the evidence in the South of England and in the North of France. In the South of England it is particularly clear and decisive. Our datum-line is positive; it is afforded by the spread of the boulder-clay, which ranges as far as south as London. That represents the glacial period. The post-glacial period I consider to be subsequent to the period of the deposit of the boulder-clay.

The first discoveries in this country were made in those districts of the South of England which had been covered over by the boulder-clay. It is in the drift and gravel of the valleys excavated in this boulder-clay that palæolithic flint implements have been so commonly found, consequently, it is clear that in all that area, man is of post-glacial age. If we get two levels, one on either side of a valley, a certain number of feet above sea-level, with masses of boulder-clay cut off on either side, then, of course, the *débris* at the bottom of the valley will consist of sand and gravel, derived from materials formed by the destruction of the boulder-clay and other strata which originally traversed the valley. The materials so spread out are newer than the boulder-clay, consequently, man in these valleys is post-glacial. There are sometimes as many as two or three successive levels in those valleys. If a valley excavated to a certain depth and the gravel-beds spread on that level, contain no flint implements, while at a lower and second level, flint implements are found, then we assume that man was introduced into this area only when the valley was excavated to the greater and later depth, and when the gravel was spread out on the level now occupied by our present rivers. It is interesting, therefore, to determine what may be the character of the mammalian remains of the successive terraces. Unfortunately the mammalian remains of all this period are so alike that it is impossible to determine from such evidence the age of those terraces. In the case, however, of bone-caves found on the sides of valleys and in districts where there is no boulder-clay, we are necessarily left to the palæontological evidence alone. In looking at the correlation of the deposits of the South of England, with the deposits which preceded, the glacial period in the North, there is evidence in both areas of the land having been inhabited previous to the boulder-clay period by animals which were likely to serve as the food of man. There is no *à priori* reason why man should not have existed before that period in the North of England; much, however, will depend upon that more complete evidence, which possibly Mr. Tiddeman may have to bring before us at some future period.



I am disposed to consider, with Mr. Tiddeman, that the cave which he is now investigating at Settle may be of pre-glacial age. I think it is not conclusive, but the evidence rather tends to show that it is pre-glacial. Further research may, I hope, decide on that particular point.

Taking the lower valley of the Thames, the evidence is this: We find in the valley, on terraces resting some 20, 30, or 40 feet above the present level of the Thames, palæolithic flint implements. At the Reculvers such gravels are found at an elevation of about 60 feet above the river, but as we ascend the valley we find that the evidence of the existence of man is confined to the lower levels. At Reading, in the high-level gravels on the banks of the Kennet, no flint implements have been found. Again, in the neighbourhood of Oxford, mammalian remains and flint implements are found only in the low level, and not in the higher level river-gravels.

Thus at the mouth of the Thames Valley, at the point nearest to the coast of France, we find evidence of man's existence in the higher level older river-gravels capping the Reculver Cliffs. He does not then appear to have penetrated into the Upper Thames Valley. It is evident that at the period that these higher terraces were deposited in the upper part of the valley of the Thames, very cold conditions yet prevailed, though post-glacial and subsequent to the boulder-clay. In the neighbourhood of Oxford, boulders of several tons in weight, carried down from a long distance, are found in these beds; and I have recently observed in the neighbourhood of Reading that this gravel where it rests upon a surface which cannot be dissolved away, such as a stiff clay, in which there is no calcareous matter, presents a very peculiar eroded surface, and it fortunately happened the last time I was there, a superficies, the size of this room, was exposed, and the flat surface of the clay presented a succession of pits or hollows apparently caused by the impinging of masses of gravel-laden ice, evidently the result of mechanical force. Thus the data for carrying man back to the boulder-clay period, may be considered as an account audited and passed. But it seems to me there is also an important suspense account now accumulating. In France there is an important series of observations which have been made by competent men and good observers, and it will not do to ignore some of the points they have brought forward. I have reason to believe from my own observations in the North of France, that there is evidence of man being pre-glacial even in the North of France. There is also one specimen which I have had in my possession for many years. I can only answer for the locality and the condition of the bone, but not for the labelling, and from the peculiar way in which it has been cut and then broken, it certainly bears all the appearance of having been artificially worked; but I must put it to a suspense account.

One further remark I have to make. Some may think from the observations of my friend, Professor Dawkins, that the oldest flint implements we know are ruder than the later ones. Mr. Dawkins relies upon the evidence from Creswell Cave, but the cause why

those implements are so rude is that they are made of quartzite, which cannot be finished in so neat a way as flint. In some part of the older deposits of St. Acheul, for example, the flint implements are better made than the newer ones found in the lower gravels of the Somme Valley.

Col. LANE FOX wished to say a few words upon a point not yet touched upon in any of the papers which had been read, viz., the means by which valleys had been eroded, and the time necessary to accomplish it. The uniformitarian theory, by which it was assumed that all the work of excavating valleys had been performed by means of their rivers flowing under the same conditions as at present, had been a good deal modified of late years, and he thought he could add a few facts from personal observation tending to show that some modification of the theory was necessary. With respect to the valley of the Somme, there was evidence afforded by relics of the Roman and bronze age found in the peat in the bottom of the valley, that the river had not materially lowered its bed since those relics were deposited, and therefore it must have taken an enormous time to work out the whole valley by means of a river which flowed with the same eroding power as at present. The valley of the Somme, however, was comparatively so narrow that it was possible the whole of it might have been eroded by such means, if sufficient time were allowed. But if it could be shown that the same conditions prevailed in other very much larger valleys where the work to be done was much greater, that would afford fair presumptive evidence that the eroding force must have been greater. He could mention one or two facts which showed that the Thames like the Somme had never shifted its bed since the bronze period. The first of these was that the river some way below Oxford, at the village of Dorchester, made a great bend; the ground on one side was high, and on the other, in the space inclosed by the bend perfectly flat and low; there was an ancient intrenchment running across this low ground from bank to bank, and converting the promontory formed by the bend of the river into a fortress. It had been ascertained by means of the relics, consisting of pottery, flints, bronze implements, &c., associated with this intrenchment, that it was certainly as early as the bronze period, and perhaps earlier, no relic of Roman work having been found there, although Dorchester, close by, was a Roman station. The intrenchment in order to serve its purpose must have rested its flanks on the river at the time it was made, and the fact of their resting on the banks at the present time, although they are only a foot or two in height, showed that the river had not shifted or lowered its bed since the bronze age. Other evidence giving the same results was found in the same river lower down. Between Richmond and Battersea the Thames makes three or four bends in the comparatively flat bottom of the valley, which is here more than four miles wide. He had found flint implements of the drift type deposited in sedimentary sand and gravel at Acton 80 feet above the present river, the discovery of which was communicated by him to the Geological Society and

published in their *Journal*. The river then since these implements were deposited must not only have lowered its bed 80 feet, but, according to the uniformitarian theory, must at each successive level have shifted its bed repeatedly so as to work out the valley, here more than four miles wide. Yet bronze and stone implements have been found in considerable numbers in all the various bends of the present river, dredged up from the gravel at the bottom by the dredging machines that have been employed of late years, and proving that the river had neither lowered nor shifted its bed since the bronze period, but if anything it has risen since that time. Was it possible, he would submit, that at this rate of progress, if progress it could be called, the erosion of the valley could be attributed to the present river flowing under the same conditions as at present? But if, as believed by Prof. Boyd Dawkins and Mr. Tiddeman, man existed in these parts during the subsidence of the glacial epoch, that would account, he thought, for a much greater flow of water having passed down these valleys in palæolithic times than was the case at present. In the valley of the Solent the same class of evidence was obtained. Mr. Evans had shown what a large amount of depression and erosion must have taken place in this valley since drift implements were deposited on the hill at Southampton. The valley of the Solent, from Portsdown to the Isle of Wight, is nine miles wide, and we have evidence in the Roman fortress at Porchester, how little it has changed in modern times; yet in the centre of this valley near Southsea Common, Col. Fox had some years ago discovered a flint station of the neolithic age, including celts, scrapers, and flakes in great abundance, the site of which was less than 10 feet above the present high-water mark, showing that flint implements continued to be fabricated in the valley after land and water had assumed its present distribution. All these facts, he thought, favoured the opinion that powerful eroding forces must have been at work before that time. The very valuable papers which had been read treated only the geological aspects of the question, but as the President had observed, there were ethnological and sociological problems to be solved, how long would it have required for the various races of man to diverge, and the earliest traces of culture to be evolved? He trusted that even if no other result came of the conference, it would show that we had not yet exhausted the subject.

The Rev. Professor SAYCE: I must begin by confessing that the evidence of language, as regards the antiquity of man, is not so decisive as that of geology. The history of language shows that his antiquity is very considerable, not that it must be measured by geological epochs. The condition of the civilised languages of the world, when we first become acquainted with them, implies a previous development of many thousands of years. It is only under certain conditions that the vocabulary of a language changes rapidly; under other conditions it changes slowly. The grammar of a language, on the other hand, may be said, roughly speaking, to

change never, and its structure to change very rarely. If we apply these conclusions to two or three languages belonging to the principal families of speech, I think we shall arrive at the following results. Take for instance the Semitic class of languages. By means of the Assyrian monuments, we are able to get back to about 2,000 B.C. for a starting-point for these. But at that date these languages were already pretty much what they are to-day. They have changed scarcely at all in either structure, or grammar, or vocabulary. At the same time, we can see plainly enough that they pre-suppose several earlier stages of existence; and when we come to compare their grammar with that of the old Egyptian, it would seem that there was a time when the parent language of the Semitic tongues was but the sister of the parent languages of the old Egyptian. Now in order to allow for the changes that must in this case have taken place in the structure of the Semitic languages on the one side, and in that of the old Egyptian on the other side, before they become known to us, we must pre-suppose an undetermined but very great period of time.

Next, let us glance at the Aryan family. Here the different dialects can be traced back to a parent speech spoken in some part of Western Asia, probably on the table-land of the Hindu-Cush. This parent speech can be hypothetically restored by a comparison of the later languages and dialects which have descended from it. In all points of grammar and structure this parent speech was as fully developed as the Sanscrit, or Greek, or Latin of a later day. The people who spoke it were in a comparatively advanced state of civilisation, and the language itself was in a highly advanced condition. Not only had the distinction of number, gender, and case been elaborated in the noun, but the verbal conjugation, the last product of the grammatical intelligence, had been pretty fully worked out. The numerous words denoting spiritual, moral, or intellectual conceptions, which originally had a purely sensuous meaning, had already come to have their later and metaphorical sense. As soon as we analyse the grammar and vocabulary even of this ancient parent speech, it becomes quite plain that it is the last result of a long series of successive stages of growth.

Take again another language—the old agglutinative language of Babylonia. The earliest monuments that contain it must be placed between 3,000 and 2,000 B.C. On those monuments the language already appears in a state of the most utter decline and decay. And since this language was one of those literary and cultivated dialects which, as a rule, change but very slowly, we have in it evidence of an idiom which has behind it a long undetermined past. If, as several scholars believe, this language, the so-called Accadian, belongs to the Ural-Altaic family of speech, in order to get back to a period when the parent of Accadian, and the parent of the modern Ural-Altaic languages were one and the same, we must assume an enormous period of time.

There is another consideration connected with the evidence borne by language to the antiquity of man, which must not be overlooked.

The science of language seems to show that most languages, whatever their present structure may be, were at one time in a condition similar to that in which the Eskimo, or North American languages, are at the present day, that is to say, a condition in which the word was not as yet distinguished from the sentence in which it was incorporated. In the case of languages so highly developed as defined, and those of the Aryan family, where the individual words are sharply marked off one from another by grammatical suffixes, as far back as our data carry us, we must be allowed an amount of time not to be accounted by hundreds but by thousands of years, if we are to get back to the primitive stage of polysyntheticism with which all languages, I believe, may be shown to have begun.

These, so far as I can see, would be the general conclusions to which the evidence at present furnished by the science of language as to the antiquity of man would seem to point.

MR. T. K. CALLARD: Do I understand that the outline of a horse represented in the diagram, belongs to the palæolithic age, and was found in the cave-earth in association with extinct animals?

PROFESSOR DAWKINS: Yes.

MR. CALLARD: We have always been led to think that palæolithic man was a rude savage who could only chip his flint implement, and knew not how to smooth it. We seem now to be getting evidence about palæolithic man of a different character. We have heard to-night of a bone needle being found in the cave-earth of Creswell caverns. A bone needle suggests to one's mind at once some step in civilisation. Men don't make bone needles unless they intend to use them, and that leads our thoughts to a palæolithic tailor, and in this very cave-earth we find evidence that artists existed at that time, and no mean artists either. Not one in three persons in this country could make a sketch like that of the horse before us. At any rate they had artists, and one thing strikes me that this Royal Academician of the palæolithic age had for his model a horse that had had his mane *clipped*. If so this indicates another stage of civilisation. We are very far advanced now, and it leads me to ask the question whether, finding the works of man in close proximity to the extinct mammalia, the mammoth and the woolly rhinoceros, justified us in saying that man therefore lived at a very remote period. I should be inclined to think that this does not so much prove the antiquity of man as it proves that the extinct mammalia are more modern than they are supposed to be.

The co-existence of man with the extinct mammalia tells nothing of the period of man's existence, unless it is also proven *when* the mammalia referred to became extinct. Of this there has been no proof adduced, and therefore to my mind the argument for man's antiquity based on the contemporaneity of man with the extinct fauna has not been sustained.

MR. HARRISON said the palæolithic character of the flint implements found at Cissbury in connection with the remains of existing fauna, including goat and pig, showed that the form and finish of



prehistoric tools and weapons were not of themselves a safe criterion of age. Though the earliest implements would necessarily have been the rudest, the converse was by no means true. There were doubtless art-centres in early times, as there are now, and Cissbury would not appear to have been one of them, but rather belonged to the far larger class of village manufactories. Some of the pits, he wished to say as the result of personal observation, may have been opened but a short period before our era. Their age does not directly affect the question of the antiquity of man in this country, which depends for its solution on geological facts.

The PRESIDENT:—I will, before calling on the authors of the papers to reply, make one or two remarks. One of the questions which have been principally discussed is this: whether in the first place we are to assign any implements found in this country to a pre-glacial, or inter-glacial period, or must we restrict them to a post-glacial period. There is one argument which has not been insisted upon to such an extent as it may deserve. It is, that some of the implements found in the gravels in glaciated districts, are made from materials derived from glacial drift, and are therefore post-glacial. The form and character of these implements give a guide by which I think you may fairly argue that others of a similar character belong to approximately the same date. Some forms of implements are no doubt very persistent in their type, but if in a certain part of England you find implements associated with a certain fauna, and if you find them associated with the same fauna in other parts, both deposits are presumably of the same date, and if one be post-glacial, the other is also. The more we examine the theory of Mr. Dawkins, the more difficult it will be to determine from examination of the associated fauna, whether implements are pre- or post-glacial. In cave deposits, however, there are certain distinctions to be pointed out. In the cave described by Mr. Dawkins, there was a succession of beds one above the other, and I think it is in the upper beds of more recent date that relics of the primæval tailor, and the primæval artist were found. Similar relics have been found in the caves of the south of France, and a needle has been found in Kent's Cavern, but at a higher level than implements which are of forms characteristic of the river-gravel. Looking at the enormous lapse of time comprised in the palæolithic period, which is evidenced by the amount of time requisite for the erosion of the river valleys, it seems possible that we shall eventually be able to establish some chronology for the palæolithic relics. If we could form any idea of the amount of time that was requisite for the excavation of a valley such as that of the Thames, we could approximately judge of the antiquity of man in this country, but for the last 2,500 years, the variation of the river-bed and its level is practically nothing, and therefore we are entirely at a loss for any measure of the power of the denuding agent, and fall back on some hypothesis as to variation in the climate. Geologists are pretty well agreed that there must have been a much greater rainfall at that period than at the present time, and the more



constant saturation of porous rocks would, by preventing the infiltration of rain, increase the eroding power of rivers.

I have already mentioned some of the discoveries which have been made abroad, the accounts of which must be received with caution.

Some of the evidence of cut bones is, to my mind, by no means satisfactory, for I have seen what appeared to be incisions, induced by natural causes. Some here may, for instance, remember a pair of horns of the Irish elk which were embedded in each other, and were exhibited to the Geological Society.

Under certain conditions, bones seem susceptible of receiving an impression, almost as sealing wax would from a seal.

Still, all the evidence of various classes must be collected, and it will become to a certain extent cumulative. In the case of the bones discovered by Professor Capellini, the incisions are very sharp, as if made by metal. If they were executed by metal implements, it is an argument against their antiquity, but my own impression is, that they are due to the teeth of some kind of shark. The question as to the distinction between the glacial period in the South of England and that of the North, is one of great interest. If either in the North or South we can carry back the appearance of man in this country to a time but little removed from the glacial period, we may safely infer he must have existed in other parts of Europe at a still earlier date. I will not however detain you by offering any further remarks, but will call upon the authors of the papers for their replies.

Thanks having been voted to the authors of the papers—

Prof. BOYD DAWKINS said that the first point to be considered was the antiquity of man in the Victoria Cave, based upon a small fragment of fibula, and two fragments of goat's bones which presented the appearance of having been cut. The fibula seemed to him to be ursine rather than human, and in size came within a very little (two-tenths of an inch) of the circumference of one of *Ursus spelæus* from Lozère. With regard to the goat's bones, he shared the opinion of Mr. Davies, of the British Museum, that they are not fossil, but recent, in other words, he did not believe that they were originally imbedded in the stratum containing the remains of the hyænas, but were derived from an upper stratum of post-Roman age in the cave, in which they are exceedingly abundant. The goat hitherto has not been found in any pleistocene strata in this country or in France, all the repeated cases of its occurrence turning out on examination to be the result of the mixing of two suites of animal remains, the one pleistocene, and the other historic or pre-historic. This is very generally done by the workmen, and this was probably the case in the Victoria Cave. But if these equivocal data be assumed to prove that man was living in this district while

hyæns occuied the cave, the evidence is still unsatisfactory as to their pre- or post-glacial age. The hyæna stratum itself appeared to him, while the explorations were under his direction, not to be of clearly defined pre- or inter-glacial age; and his doubts as to this point were, he believed, shared by Prof. Hughes. The rudeness of the palæolithic implements in the Creswell caves from the lower strata as compared with the more highly finished ones found above them, seemed to him to imply a progress in the arts in that district. *A priori*, the more highly finished should succeed the ruder implements, although of course many cases of their being mixed together were on record. Into the other avenues of discussion he would forbear to enter.

Professor Hughes, in reply to a question put in the course of the discussion, said he thought the evidence of antiquity upon which they could rely most was that derived from the amount of geographical change that had taken place since the deposition of beds containing remains of man. Observing the rate at which such changes take place at the present time, we must, *assuming conditions to remain the same*, allow a proportionately longer time for the greater changes which have taken place since the first appearance of man. But it all depended upon the assumption that conditions remain the same, as a small upheaval, for instance, would cause a rapid cutting back all along the Thames Valley and a small depression would have the contrary effect.

Referring to the remarks of Colonel Lane Fox on the age of the present channel of the Thames, he pointed out that it was probable that man had interfered more with the free course of the river during the period which has elapsed since the bronze age, than he had in all previous time, and therefore, in that case, conditions had not remained the same.

Referring to the observations of Professor Prestwich on the occurrence of pipes and pans in non-calcareous strata, he thought that they might often be explained by the settling down of stones and sand into the softened and puddled surface of the clay, the muddy water from the bottom oozing up through the stones and overflowing, and the process being repeated with greater effect each time as the pan grew deeper and the load of stones heavier. He thought that this was the explanation in the case adduced by Professor Prestwich, and in all such pipes in the valley brick-earth.

With regard to the evidence from the gravels and clay found in caves, he had already in a paper read before the Society, brought forward evidence to prove that in the case of the Pont Newydd Cave referred to by Professor Dawkins, which contained remains of the great extinct mammals and of man, the deposits containing the fossils were certainly post-glacial. ("Journal Anthropological Institute," December 9, 1873.)

He thought that a stronger case had been made out from the evidence found in the Victoria Cave near Settle, but even there he was convinced that the deposits containing mammalian remains

were post-glacial. He had watched the excavations from the commencement, and was of opinion that the boulder-clay which overlapped the cave deposits had fallen from formerly-existing pits or choked swallowe-holes, such as were so common on the limestone above.

Mr. TIDDEMAN: As to the boulders at the cave's mouth, I thought it unnecessary to bring the question forward to-night, but as Professor Hughes has raised it, I must follow him. There is one very important point he forgot in his section of the cave. We found a mass of talus lying beneath the cliff and dipping outwards; it was 20 feet thick, and at the base of the talus we had the deposit of boulder-clay, and at the back of the boulder-clay was the hyæna-bed. Professor Hughes says this boulder-clay fell from the top of the cliff at a time subsequent to the age when the bones were deposited, and might therefore have been recent. We have above that clay 20 feet of limestone fragments weathered from the cliff above by the rain and frost of successive seasons: that represents a very considerable lapse of time since the boulders were deposited there. If the boulder-clay fell at a subsequent period, how is it that it was not mixed up with the talus? If it fell immediately after the ice melted away and before the talus formed in any quantity, why that implies all that I maintain.

I may remark that the fibula and the cut bones are after all the smallest and most insignificant part of the evidence. The matter we have to consider is whether that fauna which has been found in Europe and in our own isles with works of man, and in some places with his remains, lived at a time which we are able to correlate with certain great physical events. As to Pont Newydd Cave, the implements made from travelled boulders to which Professor Hughes has referred, are no evidence at all that the men who made them lived there since the last glaciation of that district. That they were made in or after glacial times does not prove that they were not prior to certain other glacial times.

With regard to a fibula making its way down into the earth, I will not dispute the fact that a bone might do that in certain cases, especially after Professor Rolleston's experience, but in the Victoria Cave it would have had great difficulty in getting down. In soft mud, it might have a chance of getting down, but if it were modern, you would have other modern things going down with it unless it had a start at the first.

Professor ROLLESTON: It is pointed at both ends.

Mr. TIDDEMAN: I do not think there could be a possibility of its working its way down. There were large blocks of stone and beds of stalagmite which we had to blast in opening the cave down to it, and it lay at a depth of 25 feet. I sincerely hope geologists will bear in mind, as new facts crop up, the suggestion that we have in England evidence of two great glacial periods, and test it by them.

The meeting then terminated.

## ANTHROPOLOGICAL MISCELLANEA.

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### *SOCIETY for the PROTECTION of ANCIENT BUILDINGS.*

A NEW Society has been formed for the above object, and in the prospectus, which has been circulated, the founders say: "No doubt within the last fifty years a new interest, almost like another sense, has arisen in these ancient monuments of art; and they have become the subject of one of the most interesting of studies, and of an enthusiasm, religious, historical, artistic (and it may be added, anthropological), which is one of the undoubted gains of our time; yet we think that if the present treatment of them be continued, our descendants will find them useless for study and chilling to enthusiasm. We think that these last fifty years of knowledge and attention have done more for their destruction than all the foregoing centuries of revolution, violence, and contempt. For architecture, long-decaying, died out, as a popular art at least, just as the knowledge of mediæval art was born, so that the civilised world of the nineteenth century has no style of its own, amidst its wide knowledge of the styles of other centuries. From this lack and this gain arose in men's minds the strange idea of the restoration of ancient buildings; a strange and most fatal idea, which by its very name implies that it is possible to strip from a building this, that, and the other parts of its history, of its life, that is, and then to stay the hand at some arbitrary point, and leave it still historical, living, and even as it once was. In earlier times this kind of forgery was impossible, because knowledge failed the builders, or perhaps because instinct held them back." The Society starts with 160 members. The annual subscription is half-a-guinea, and the Honorary Secretary, W. William Morris, 26, Queen's Square, Bloomsbury.

A. LANE FOX.

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### *PRESERVATION of ANCIENT MONUMENTS and ANTIQUITIES in OHIO.*

VALUABLE records of the pre-historic earth-works of Ohio are to be found in the "Smithsonian Contributions to Knowledge," vols. i and iii. The plans and sections of ancient fortifications and other ancient monuments described by Messrs. Squier, Davis, and Whittlesey, are

examples to all pre-historic archæologists of the detail and accuracy required for such purposes.

Notwithstanding this, however, it appears a great number of these monuments, in which the State of Ohio is so rich, are passing away under the operations of agriculture, without having been duly described. The State Archæological Association of Ohio was originated at Mansfield in September, 1875, and held its first annual meeting at Newark in October last. Its cabinet has been located at the Capital, and will be kept in the State House, with its permanence and safe-keeping ensured by the Government. The "Cleveland Leader" of the 3rd of June, contains an appeal from the Society to the citizens of the State to aid them in the objects of the Association. A State Museum of Antiquities is to be formed at Columbus, and the next annual meeting will be held at Cincinnati, on the 3rd September, 1877. Any person may become a member by forwarding to the Secretary, Mr. Stephen D. Peet, of Ashtabula, three dollars as initiation fee, which will entitle him to an equal part in the discussions, and a copy of the annual proceedings.

A. LANE FOX.

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*The following is a TRANSLATION\* of the greater part of the ADDRESS delivered by M. BROCA, President, at the Opening Meeting of the French Association for the Advancement of the Sciences, at the Havre Congress, 1877.*

# I.

THE earliest memorials of man carry us back to a time when societies were already organised, and in which nations had already acquired a certain amount of civilisation. Savages have no history; their oral traditions change and alter their original form in each generation, and at last become lost, to make room for traditions equally transient, and the most important events are thus sooner or later consigned to oblivion. Writing alone fixes memorials on a monument or in a book. Narratives more or less historical cannot then go back beyond the invention of writing, and this invention, which implies culture to a certain extent, has of necessity been very slow in progress.

Some of the nations of antiquity it is true boasted of numberless ages for their past history; they paraded in their chronologies periods of tens, and hundreds of thousands of years, but criticism has without difficulty disposed of their claims. In these days, spite of the discoveries of Champollion, and the labours of Lepsius and Mariette and their followers, who have restored upwards of twenty

\* By permission of the author.



centuries to the archives of ancient Egypt, no actual date can be assigned for the commencement of the *historic* period beyond six or seven thousand years.

Thus if we only consulted history, we might well suppose that man is quite recent in his appearance on the globe, and much later than those geological phenomena which have modified the conditions of life, and, by the change in climates, have also changed the floras and faunas. These opinions were everywhere accepted when geologists undertook the vast work of reconstructing the past ages of our planet, when our illustrious Cuvier created the palæontological system, when his genius reanimated the extinct species, and summoned before the tribunal of Science these mute but eloquent witnesses of the successive phases of our globe. Though still devoted to the hypothesis of sudden revolutions and universal catáclysms, Cuvier understood what an immense lapse of time is represented by a geological period, and, as the shortness of the historic period contrasted to such a degree with the incalculable antiquity of the fossil animals, was it not natural to believe that man had not appeared till long after them? This was Cuvier's conclusion, and it conformed with received ideas to such an extent that it at once became classical. Some went even further than Cuvier: the author of the "*Discours sur les révolutions du Globe*" (1825), confined himself to saying that there was no proof of the existence of fossil man, and added that it was *improbable*; but even this was not enough, and on all hands it was pronounced *impossible*. For all this, many facts opposed to this opinion soon appeared, but they were met only with doubts and scorn. It was in vain that, either in the floors of caverns, or in palæontological deposits, human bones mingled and confused with those of animals of the quaternary age were discovered; systematic objections were always presented; the floor must have been rearranged by upheaval, sinking, or landslip; man might have dug there to bury the dead; he might have been entombed by earthquakes in the caverns in which he sought shelter; he might have fallen by chance to the bottom of a deep and narrow cleft; his bones rolled about by torrents might have been deposited by accident in old water-formed channels. It was fortunate when the authenticity of the discovery and the competence and sagacity of the observer were not impugned. Thus were cast aside the discoveries made in 1828 by Tournal of Narbonne in the cavern of Bize (Aude), in 1829 by Christol of Montpellier in the caverns of the Gard, afterwards by Emilien Dumas and Dr. Pitore in two caverns of the Gard and of the Herault, and by M. Ami Boué, of Vienna, in the quaternary deposits of Lower Austria. The vast researches of Schmerling in the caverns near Liége (1833), and notably in the Grotto of Engis, now so celebrated, had no better reception. The remarkable cranium of Mont Denise (Haute Loire) found in 1844, by M. Aymard, in a bed of mud-lava which conceals the remains of many lost species, did however at last attract attention, but it was always urged in



objection, that this human relic might, through some displacement of the soil, have slipped to the bottom of a fissure.

Facts of this nature, in those days made no impression, however decisive they may appear to us. They were, so to speak, challenged beforehand. To overcome such an opposition, an overwhelming amount of evidence was required. To afford this, it was necessary to prove the presence of man, not only in caverns of the quaternary epoch or in ossiferous breccias, or in earth on the surface of declivities more or less liable to slip, but also in the soil of great valleys, in horizontal and undisturbed strata still *in situ*, and under such conditions as to render the hypothesis of their having undergone any kind of "remaniement" altogether impossible. The extensive beds of sand or gravel deposited in the bottoms of existing valleys by the powerful streams of the quaternary age most often combine these conditions. It was there that Boucher de Perthes sought for proofs of the existence of ancient man. There it was he discovered lying mingled with the bones of the rhinoceros and mammoth the flint weapons used by man in his struggles with these monsters of another age, and the innumerable implements fashioned by his hands to supply his wants.

Boucher des Perthes was not a certificated *savant*, and for a long time his assertions were not believed. His illusions were smiled at, and the dreamer who wasted his life in search of an impossible goal was pitied. But this dreamer possessed a conviction which gives courage, and a perseverance which leads to success. From 1840 to 1858 he struggled patiently with the indifference of some and the scoffs of others. He only asked for examination and verification, but he could not obtain even these, for Dr. Rigollot, the only believer he had convinced, was not in earnest. At last, after eighteen years of struggles, he saw the day of justice dawn. The celebrated English palæontologist, Falconer, willingly went to Abbeville in 1858 to examine at one and the same time the sites explored by our indefatigable compatriot, and the rich collection of worked flints and fossil bones there found. Other English *savants*, Messrs. Prestwich, Evans, Flower, and Lyell followed close at hand. They themselves made successful searches at different points in the valley of the Somme, particularly at St. Acheul, near Amiens, in a site already in 1854 pointed out by Rigollot. Stimulated by this example, French *savants* in their turn arrived; and M. Gaudry, M. George Pouchet, and others were able to obtain with their own hands axes of worked flint from the quaternary deposits of the Somme.

The facts discovered by Boucher des Perthes were thus fully confirmed. The sanction of public discussion alone was now needed. This was given them by the Société d'Anthropologie of Paris. In that body a *savant* whose prudence was equal to his good faith, Isidore-Géoffroy Saint Hilaire, declared that the last objections to the antiquity of man had vanished. The question was examined in all its aspects at several meetings, and all hesitation was removed. The discussions, published in the papers even before the appearance

of the Proceedings of the Society, had a great effect. Fossil man henceforth had an established place in positive science, and the glorious name of Boucher de Perthes resounded through all Europe.

This name will for ever be connected with one of the greatest discoveries. History is under obligations to all who have cleared the approaches to important truths, to all who have had but glimpses of those truths, as also to those who have supplied the proofs, but to him who has enabled her to triumph, a yet higher place is assigned. History will recount how before Boucher de Perthes, the fact of the existence of fossil man already rested on authentic grounds. It will record notably the discoveries made in the caverns of Liège by the learned and courageous Schmerling, and published by him in a work of the highest merit. To the names already mentioned, history will add those of Eberhardt of Würtemberg, of Esper, of John Frere, who in the 18th century, before the classification of the geological epochs, dug up human remains and worked flints now recognised as belonging to the quaternary deposits; justice will be rendered to Jäger, who in 1835 recognised the great antiquity of the Canstadt skull (discovered upwards of a century earlier, and for long considered apocryphal); but with due praise to these workers in the advanced guard, it is Boucher de Perthes who will receive the homage due to the bold wrestler who maintained the final struggle and came off the victor.

The year 1859, which beheld the theory of the antiquity of man burst upon the scientific world with irresistible force, marks the commencement of an era rich beyond others. New and boundless horizons opened out before *savants*. All Europe, geologists, archaeologists, anthropologists, threw themselves into the work with startling energy. Only eighteen years have elapsed, and never perhaps in so short a time has such a rich harvest been garnered. Who can forget those days of new life when from the bowels of the earth, from the depths of caverns, sounded the voice of the past; when the fossil communities lived again, became again alive:—

“When the old world, like Lazarus, upheaved  
The stone which held his now reviving youth  
Within the tomb.”

Boucher de Perthes had only lifted a corner of that mysterious veil which hides the origin of man. He had proved that man had existed throughout the quaternary epoch, that he had been in our country, the contemporary of the reindeer and of animals which now only exist elsewhere, of the mammoth and other extinct animals. But was this all? and was not the human race even yet more ancient? This last question, more important than the other, presented itself at once. More important, I say, for each of the three periods of the tertiary age was of much greater duration than the quaternary. I will not here recount the researches concerning tertiary man. The discoveries of M. Desnoyers at St. Prest, near Chartres, and of Professor Capellini in many tertiary sites in Tuscany, tend to establish the fact of the existence of man in the pliocene age; those

of the Abbé Bourgeois, in the commune of Thenay (Loir-et-Cher), would carry back even to the miocene age, that is to say, to the middle tertiary, the existence of an intelligent being who could work flints, and could only be man.

But these facts, though collected by highly competent observers, and accepted after careful discussion by many eminent *savants*, are not yet sufficiently numerous or unopposed to constitute a definitive proof.

Tertiary man is as yet only on the threshold of science, and he is in the same position that quaternary man held some twenty years back. Will another Boucher de Perthes arise to prove his existence by evidence convincing to all? That is one of the secrets of posterity.

Quaternary man, on the other hand, has now become classical. He has been found in most parts of Europe, and in many places in the New World. His weapons and implements, preserved in many public and private collections, are numbered by hundreds of thousands. The diggings in the valley of the Lesse, in Belgium, have alone supplied 80,000 worked flints. These innumerable *débris* of quaternary manufacture have been got, sometimes from the earth of valleys in which the relative position of the strata is enough to mark their date: at others from deposits rich in natural flints, where man had established his workshops; here in the rock shelters where he camped; there, in the caves in which he lived. In the cave dwelling places the finds have been most abundant: in these last we have been able to study even the details of the life of a tribe, the remains of feasts, the weapons for the chase and for fishing, the sewing implements, all the products of the flint worker, to which may be added at a certain period, handsome implements of bone and reindeer horn: then, the symbols of power, ornaments, objects of commerce, and lastly, wonderful to relate, the works of artists, sometimes rude and uncivilised, at other times full of grace, motion, and truth, representing by engraving or sculpture the animals hunted in those days—the bull, horse, aurochs, reindeer, the great cave bear, and even the gigantic mammoth.

Thanks to many discoveries, the authors of which are too numerous to be named, quaternary man is now-a-days better known than many historical nations. He has his chronology, not one of years or epochs, like ours, but of archæological and paleontological periods, vast spaces of time, taking date according to the various fossil species which predominated successively around him, and according to the different types of implements marking the gradual evolution of his work. He has his history also, not indeed political, but anthropological; not that of peoples and chiefs who became celebrated, but that of races who supplanted and succeeded one another on the same soil.

These races are distinguished by the skulls and bones which have been found in the quaternary deposits. We cannot say we know them well, or even their exact number, for the valuable remains which represent them are as yet too scarce, and often too much

damaged to be of use as a foundation for complete descriptions. We, however, know enough to be certain of a great number and variety of quaternary races, and although the regions hitherto examined comprise only western and part of central Europe, we can henceforth, in this small corner of our globe, recognise and distinguish at least three fossil human races which may be referred to two essentially different types. I will first say what are these two types, and then what are these three races.

## II.

Under the name dolichocephalic, which means long-headed, are classed the skulls of a long shape, and under that of brachycephalic, or short-headed, those of a round shape.

The horizontal contour of the head, an idea of which may be formed by looking at the opening of a hat, is a kind of oval, longer than it is broad, of which the form, in other respects very variable, depends principally on the relative extent of its two diameters.

When it is much longer than it is broad, or in other words, when the antero-posterior diameter much exceeds the transverse diameter, the skull is *dolichocephalic*, or long. On the other hand, when the difference of these two diameters is slight, it is *brachycephalic*, or short.

Between these two extreme types there is a medium shape, called *mesaticephalic*, or intermedial. In order to obtain, according to this classification, an exact definition, we measure the two diameters with a compass; we divide the second by the first, and obtain a decimal fraction called the *cephalic index*. The two first figures of this decimal are the *characteristic* of the index. We thus reduce the long or short-shaped skull to a numerical expression. Those are dolichocephalic in which the cephalic index is less than the fraction  $\frac{1}{2}$ , or as 77.7 : 100, the brachycephalic are those in which the cephalic index is greater than the fraction  $\frac{1}{2}$ , or as 80 : 100, and the mesaticephalic are those whose index lies between these two limits. But the variations of the cephalic index are so numerous that it has seemed advisable to distinguish two degrees of the dolichocephalic type, *i.e.*, the dolichocephalic proper, whose index is below 75 : 100, and the sub-dolichocephalic, whose index is above this point. In the same way, in the brachycephalic, we distinguish between the brachycephalic proper and the sub-brachycephalic, according as the index is less or greater than the fraction  $\frac{3}{4}$ , or as 83.3 : 100.

In consequence of the numerous mixtures of race during the historic period, these different forms of skulls exist to-day amongst nearly all the European populations to a varying degree of frequency.

Most often, however, there is a certain cephalic type, which prevails to a greater extent than any other, and which points to the greater influence of such and such a race. In France, for instance, the brachycephalic predominates from the Alps to Brittany, through the region occupied in Julius Cæsar's time, by the celebrated Celtic

confederation, whilst to the north of the Seine and the Marne in the ancient Belgic Gaul, the population is mostly sub-dolichocephalic. From this fact, and researches of a similar kind which have been made in other countries, we may conclude with certainty that the peoples of Europe are derived from many races, differing much in the shape of the skull.

The illustrious Swedish anatomist, Retzius, who first in 1842 established the difference between the brachycephalic and dolichocephalic forms, thought that this continued division of cephalic types might be attributed to the mixture of two races only, the one brachycephalic, the other dolichocephalic. At this date the existence of fossil man was not yet admitted, though many years previously Thomsen already had discovered the succession of the ages of industry, stone, bronze, and iron, and it was no longer doubted that before the period of the Indo-European migrations, Europe had autochthonous peoples. Combining this idea with his craniological studies, Retzius supposed that the primitive European race was brachycephalic, and that the dolichocephalic type was first introduced by the conquering Asiatic race. The obscure and complicated problem of the origin of the European race was thus reduced to a charming simplicity and clearness, and never had hypothesis such a general and rapid success. For nearly twenty years, Retzius's ethnogenic theory was admitted without opposition, and some few facts favourably interpreted, seemed to strengthen it: but when it was decided to investigate it more closely, these facts faded away one after another, and this brilliant theory, already much shaken, was finally upset by the discovery of the fossil human races.

The difference between the races of Europe does not date from the almost recent era of the Asiatic invasions, nor from that long age of polished stone which preceded the introduction of metals and succeeded the reindeer age. It goes back to the quaternary age. In that fact, Retzius's hypothesis would lose much of its importance; but further, the dolichocephalic type, so far from being the last arrival, is the earliest of all; the emigrations and mixtures of races far from developing, only weakened it, and these brachycephalic people considered till lately as autochthones, overcome and dispossessed by stronger and more civilized races, were, on the contrary, the invading strangers whose slow and progressive immigration modified, in a manner as decided as durable, the ethnology of Western Europe. They only appeared on the scene in the last days of the quaternary age. Before them two dolichocephalic races had successively occupied the land, and we shall now show the chief characteristic differences between these three races, recovered by science after so many centuries of oblivion.

### III.

By what names shall we designate them? A race of which there are no records, can only have a conventional name. The most suitable one will be that of the place whence the first authentic



and characteristic facts concerning them were derived. On this plan, borrowed from geologists, MM. de Quatrefages and Hamy have called the three principal fossil races by the names Canstadt, Cromagnon, and Furfooz. The Canstadt race is the oldest of all, and its remains are the scarcest; by chance, however, they were the first discovered. In 1700 Duke Eberhard of Würtemberg, a great antiquary, had some excavations made in an *oppidum* of the Roman period at Canstadt, near Stuttgart. The workmen drove their picks into the neighbouring earth, and discovered there a certain quantity of fossil horns and bones, amongst which was a large fragment of a human skull. But no attention was paid to this precious relic. It was only 135 years later, that is in 1835, that the learned palæontologist, Fred. Jäger, rediscovered it in the collection of the Princes of Würtemberg and recognised its value. He ventured to conclude from it that man had been the cotemporary of the large quaternary animals. He was answered, that excavations of so remote a date were not to be relied on, but to-day the genuineness of the Canstadt skull is undisputed, and this cranium, so long disdained, has had the honour of conferring its name on the first fossil race.

Six or seven other skulls, very imperfect, some fragments of jawbones, and some portions of long bones are up till now the only remains of the Canstadt race.

Two of these relics have owed their great celebrity to the discussions raised concerning them: these are the skull found in 1857, by Dr. Führlrott, in the Neanderthal cave, near Düsseldorf, and the lower jawbone, discovered in 1865 by M. Dupont in the Naulette cave, in the valley of the Lesse (Belgium). The jawbone of Naulette presents a combination of marks of inferiority truly surprising, and the general shape of the Neanderthal skull, its low and retreating forehead, the enormous projection of the superciliary arches, which recalls that of anthropoid apes, is not less startling. It is well, however, to add that the characteristics of the Canstadt race are shown in an exaggerated way in these two fragments.

The examination of the fragments of the long bones which have been rediscovered shows that the Canstadt race was very robust, but of small stature, probably not more than 1 m. 68 c. to 1 m. 70 c. (5 feet 6.14 inches to 5 feet 6.93 inches). The skulls, for the most part much damaged, can only be partially studied, still they can be clearly distinguished from all that have succeeded them. One word will describe their characteristic; it is *dolichoplatycephalic*, i.e., it is at once dolichocephalic and platycephalic. By this name *platycephalic* (the etymology of which is not quite correct) we designate skulls whose roof is very flattened, and which consequently have a very small vertical diameter.

The dolichocephalism of the Canstadt men reaches a point which for a long time has ceased to exist as a mark of race in Europe, and which is only seen in modern races among the Australians and Esquimos. A dolichocephalism, almost as marked, is found in the second or Cromagnon race, and even in one of the races of the polished stone age; but in them it coincides with a much



loftier form of skull, which contrasts in a striking way with the platycephalic race of Canstadt. This platycephalism is due mainly to the great reclination of the forehead, which instead of rising above the face in an elegant curve, slopes rapidly backwards, in consequence of which additional volume and prominence is apparently given to the whole sub-orbital region, including the naturally voluminous and strongly-curved *orbital arches*, together with the strongly developed *superciliary eminences* and glabella. The frontal region of the skull is thus considerably diminished; whilst posteriorly, on the other hand, the occiput projects very considerably. But notwithstanding this compensation, the cranial capacity remains very small, being apparently less than that even of the Hottentot and Australian. And it is still further diminished, it may be added, by the great thickness of the cranial walls. Other marks of inferiority are evident in the lower jawbone. These are the proclivity of the incisors, the great size of the molars, the total absence of the projection of the chin, and the elliptic form of the alveolar arch, which has a tendency to contract behind, like a horseshoe.

The only skull in which it has been possible to study the face in its entirety, is one found in the Forbes Quarry at Gibraltar. I think with MM. de Quatrefages and Hamy that this skull belongs to the Canstadt race; with which its connection is shown chiefly by the conformation of the superciliary eminences, the forehead, the occiput, the thickness of the walls, and the smallness of the brain-case; unfortunately the absence of characteristic fossils prevents our being able to determine the date of the deposit in which it was found.

Be that as it may, the Forbes Quarry skull exhibits extremely curious characteristics in its facial region; the very oblique line of profile, the very wide and deep nasal orifice, the great width between the cheek bones, the rounded and truly immense orbits, exceeding by more than 100 square millimetres the largest orbital area up to this time measured on any human skull, and lastly, what is still more strange, a strongly-marked convexity, in place of the canine fossa. Such are the principal features of this facial region, which has nothing analogous in other known races, and which would be a type in itself if we did not class it with that of Canstadt.

The Canstadt race was decidedly very savage, more so without doubt than any existing race; it possessed none but very rude implements, and its wandering tribes struggled painfully with the hardships of life on a soil of which the powerful quaternary animals, the great Bear, the Rhinoceros, and the Mammoth disputed the possession. Nevertheless its geographical spread was immense. It has been met with at Brux in Bohemia, at Canstadt in Würtemberg, and Neanderthal in the Rhenish Provinces, at La Naulette in Belgium, at Eguisheim in Alsace, at Paris in the lowest gravels of Grenelle and Clichy, at Arcy-sur-Cure in the department of the Yonne, at Mont Denise in that of the Haute Loire, at Olmo near Arezzo, in Tuscany, and lastly, probably in Gibraltar. It occupied therefore a large part of Western and Central Europe, where it kept its hold from the beginning of the quaternary age till near the

middle of that period. But then appeared another race more powerful and more capable of improvement, which possessed itself of its domains, and doubtless only succeeded it on its almost extermination. This second fossil race is that of Cromagnon. It derives its name from a rock-shelter discovered in 1868, near the village of Les Eyzies in the valley of the Vézère, Dordogne. The celebrated Engis skull, found by Schmerling in 1834, belongs to the same race, as also do the two skulls found in 1867 by M. Brun in the shelter of Lafaye, near Bruniquel; but Schmerling had referred the Engis man to a negro or a negroid race; and the Lafaye skulls were not sufficiently characteristic to reveal the existence of a special race. It is then the Cromagnon discovery which for the first time allows us to distinguish and describe the second fossil race, since then found in a host of other places.

This race represented in our museums by a score of skulls, some of which are perfect, by some skeletons almost complete, and by a very large number of bones more or less isolated, is now well known. It is dolichocephalic, like that of Canstadt, and almost to the same degree, but in other respects it differs widely from it. Its stature is much taller, the Mentone skeleton, which M. Rivière was able to preserve entire, measures 1 m. 85 c. (6 ft. 83 in.). The Cromagnon old man is more than 1 m. 80 c. (5 ft. 10.86 in.), and the mean height of the men is as high as 1 m. 78 c. (5 ft. 10.08 in.). The skull is very large, and its capacity is equal to, if not greater than, that of the modern Parisian. The strong superciliary ridge which characterises the Canstadt race is not found here. The forehead is not retreating, on the contrary, it is straight and high, forming as far as the bregma a fine curve, below which the frontal eminences and the glabella, reduced to a moderate size, form an even surface. The vertical diameter is well developed, and the lofty well-arched roof contrasts with the platycephalic roofs of the skulls of the first race. The occipital region is always roomy, and still considerably vaulted, but it is only moderately prolonged behind the parietal bones.

The facial region presents distinct characteristics quite as marked as the foregoing. The chin, instead of retreating, as in the cases of La Naulette and of Arcy, stands well out, and the lower incisors have become vertical. The superior orbital borders are no longer strongly arched; on the contrary, they are much flattened, and the orbital opening considerably developed in width, is of slight height. The nasal region, long and narrow, shows the leptorhinian shape common to all Caucasian races. Nevertheless, the cheek bones are very wide apart, and though the face on the whole is but little slanting, the region of the upper incisors presents a marked obliquity. The Cromagnon race is not only distinguished by the conformation of the skull and of the face, but also by that of the principal bones of the limbs. It would take too long to describe here the pilaster-like femur, the flattened or platycnemic tibia, the grooved fibula, the bowed ulna; these special forms, which are still found now-a-days in certain individuals, not combined—but isolated, and besides more

or less unpronounced—were normal in the Cromagnon people, which was in that respect distinguished from all modern races.

Those who consider the volume of the brain as an element of the intellectual power; those who know that in this respect there are mean differences of 130 to 150 cubic centimetres and more, between the superior and inferior races, have been somewhat surprised to find that the character of the mean cranial capacity, places the Cromagnon people on a level with ourselves.

But it must be noted that we are here dealing only with averages, for the study of individual cases show that on the contrary our maxima exceed theirs. Civilized societies support among them those who are weak and feeble, and infirm in mind or body. These outcasts of nature could not carry on the struggle for life in the earlier societies, where every individual could only reckon on himself, and where each day his existence depended on his own strength, sagacity, and foresight; in each generation the stern law of selection eliminated the weakly; and it is their absence which gives an apparent superiority, not alone to the Cromagnon race, but also to one of those which succeeded it during the polished stone period.

Besides, if we study the relative development of the anterior and posterior portions of the skull according to the Abbé Frère's method, we find that the anterior portion, which contains the nobler part of the brain, is markedly smaller in these prehistoric races, than in our modern races perfected by education.

If these observations be true, the large cerebral volume of the Cromagnon race ceases to be a paradox, but it is still of the greatest importance. It shows us that this race must have been very intelligent, and we know in fact that it was so. To it was due the remarkable perfecting of the working in flint. It was this race which first learnt to work the reindeer horn, bone, and ivory; and rising to the conception of art, discovered drawing, carving, and sculpture. Such progress in such an age, is evidence of the intelligence of the race that effected it.

This race does not seem to have spread as far eastward as that of Canstadt. Traces of it have been found in Southern Italy, and probably also in Great Britain, but it chiefly occupied France and Belgium.

The south-west of France, between Périgord and the Pyrenees, seems to have been its chief dominion. Its chronology embraces about the second half of the great quaternary age; its most ancient stations correspond with the mean level of the valleys, that is to say with the so-called *intermediate age*, and its latest bring us up to the end of the reindeer age, which was the third and last of the quaternary period. This reindeer age was the epoch of its prosperity, I might almost say its splendour. But when the disappearance of the reindeer, and the increasing mildness of the climate, marked the end of the palæontological period, and the commencement of the present geological epoch, the Cromagnon race heard the knell of their decadence sound.

It was reindeer flesh which supplied their chief food; the reindeer horn was the first material of their industry and arts.

The manner of life, choice of dwelling places, division of labour, social constitution of these tribes, all depended on the supplies afforded by their hunting grounds, and when these were insufficient, the society of these reindeer hunters was thoroughly disorganised.

The chase henceforth could not supply the wants of a numerous population; the future belonged to pastoral and agricultural peoples and the men of the polished stone age, who had arrived at this pitch of civilization, speedily supplanted the Cromagnon race. If we only consulted archæology, it might be thought that this last race vanished at the same time as the reindeer. It is certain, in fact, that the localities which characterise it, and the industry and arts connected with its name, are not found in the polished stone or *neolithic* age; but the race itself, though considerably weakened, had not quite perished. Some tribes, as that of the *Homme Mort* cave in Lozère, maintained themselves for a long time, even in the midst of the *neolithic* population. Elsewhere, as at Solutr , the survivors mingled with the new races; and in this cross their influence was sufficiently strong to leave a lasting anthropological stamp. Their anatomical characteristics, doubtless rendered fainter, but always recognisable, persisted for a certain number of generations; and even at the present day they sometimes re-appear, following the laws of the remote heredity, designated *atavism*.

The Cromagnon race has brought us down to *neolithic* times. The study of the third fossil race, or that of Furfooz, will bring us back to the reindeer age.

The Furfooz race was discovered in 1866 and 1867 by M. Dupont in several caves situated on the right bank of the Lesse, near the village of Furfooz, Belgium. A burial cave afforded skulls and bones which characterise the race, and the dwelling caves have enabled us to observe the industries and manners of the population. The Furfooz is quite different from the large Cromagnon race. The height, much less, varies between 1 m. 53 c. and 1 m. 62 c. (5 ft. 23 in. and 5 ft. 3.78 in.), descending as low almost as among the Laplanders. The bones of the limbs do not show in their conformation any of the remarkable characteristics which distinguish the men of Cromagnon. The femur, tibia, fibula, and ulna, are exactly similar to our own, and the sole peculiarity to be noticed is the degree of frequency of the perforation of the humerus in the olecranon fossa. This perforation, which has been wrongly considered as a simian characteristic, or at least one of inferiority, has no rank-signification either in man or in apes. It is not constant in any race, and is found more or less commonly or more or less rarely in both. It is now somewhat exceptional in Europe, but was much less so formerly. Thus it is only found in about 4 per cent. of the bodies in the Paris cemeteries, while in some burial places of the *neolithic* age it amounts to 15 or even 25 per cent. In the Furfooz race it occurs in 28 to 30 per cent. It is worthy of remark that the perforated humerus has not yet been found in the first two

fossil races. If it existed among them it was only as an exception, and we may suppose that this interesting characteristic was introduced into Western Europe by the Furfooz race.

But it is in the form of the skull particularly that this race differs from those which preceded it. With it appeared for the first time a rounded type of skull which is not quite the true brachycephalic, but which heralds the approach of the brachycephalic people. The skull on the whole is small, particularly so in the anterior portion; the forehead is narrow, low, and retreating, the roof but little elevated; in these respects the Furfooz skulls take place below those of Cromagnon, and are a little allied to the Canstadt type. The face, in comparison with the Cromagnon one is smaller, the cheek bones less prominent, the orbits not so broad, and higher, the nasal opening shorter in proportion to its breadth, the lower jaw bones smaller and less thick. That would be quite sufficient to distinguish the two races, even if the cephalic index did not mark the difference between them.

In the Cromagnon race, which is highly dolichocephalic, this index is only 73 on an average, whilst the two perfect skulls of Furfooz, with their indices of 79 and 81, the average of which is 80, are on the border of the mesaticephalic and the sub-brachycephalic, and it even seems probable that in these two skulls the cephalic index had been lessened by a mixture of race, for in the same grave and near them, a less perfect skull was found, which was very dolichocephalic, and belonging apparently to the Cromagnon race.

The Furfooz race only appeared in Belgium in the latter part of the reindeer age. No remains of the large mammal contemporaries of the mammoth have been found in the remains of its feasts. The reindeer even is rather rare, and it is evident that this animal was about to disappear. The Furfooz people only lived by the chase, and dwelt in caves. They had that much in common with the Cromagnon race, but were far inferior to it in other respects. They were not acquainted with drawing or sculpture, their industry was very backward, their worked flints careless in execution, their weapons of reindeer horn shaped without taste; nothing reminds us of the handsome daggers, and barbed arrows of the troglodytes of the Vézère. It may be questioned even if they were acquainted with the use of the bow; but they could make articles of pottery, very rude, it is true, but no trace of which is found in the stations of the Cromagnon race, and which marks a date little anterior to the polished stone age. At the same period that this mesaticephalic or sub-brachycephalic race inhabited Belgium, men with rounder heads, true brachycephalic people, with indices of 83, 85, and even more, penetrated into France on the eastern frontier. At Solutré in the Mâcon country they mingled with those we can hardly call the reindeer hunters, for the reindeer was already scarce, and now it was horse flesh that formed the chief diet. In this locality, where the perfection of the flint working is remarkable, we find side by side with the Cromagnon skulls, some which are quite brachycephalic. Those found by Emile Martin in the upper sands of Grenelle,



tend to prove that the brachycephalic race had then advanced as far as the Paris district, but there is some doubt as to the degree of antiquity of this station, in which Emile Martin has not found the remains of any quaternary animal. Be that as it may, the discovery made in the loess of Nagy-Sap near Gran, in Hungary, proves that the true brachycephalic people already existed on the Danube in the middle of the quaternary age. It is easy to understand that towards the end of that period they may have struck westward, but their ethnogenic influence was then much restricted. Their immigration did not actually take place till the following ages, which belong to the existing geological period, and do not enter into the present subject.

Should we consider these brachycephalic people as forming a fourth fossil race? Yes, no doubt; if we give a purely morphological acceptation to the word *race*, but, if we join to that the idea of *filiation*, the result will possibly be different. It is, in fact, neither impossible nor unlikely that the Furfooz race was nearly affiliated to these true brachycephalic people, that it was a first swarm from them, modified by intermixture, after a long residence in the midst of the dolichocephalic race of Belgium, and actual community of habitation, as the fact of their common burials clearly proves.

Since the quaternary period of which I have spoken, many centuries have elapsed; numerous populations and many races have, before and since the historical period, clashed and supplanted each other on our soil; and it is not the lightest task of Anthropology to determine amongst the physical, intellectual and moral characters of the existing population, the respective influences of so many diverse elements. Nations, like families, are fond of counting up their ancestors, of enhancing the length of their genealogy, and of regarding the antiquity of their origin as a title of nobility. Our complex nation, which derives its modern name from a Germanic people, its civilisation from the Latins, its chief glory from the Gauls, may now add to its past an incalculable series of ages.

If it does not blush for the barbarism of the Celts, why should it be ashamed to number among its ancestors those neolithic Triptolemi who knew how to render the soil fruitful by agriculture; those rough quaternary hunters who had skill to wrest its possession from animals more terrible and more real than the monsters with which Hercules fought—and above all those intelligent Troglodytes of the Vézère who, first of mankind, were able to kindle the torch of Art long before the Assyrians and Egyptians?

Barbarous no doubt they were, but are not we also barbarous in some degree? we who can only settle our differences on the battlefield. *They* were not acquainted with electricity or steam, they had neither metals nor gunpowder; but wretched as they were, and with only weapons of stone, they carried on against nature no mean struggle; and the progress they slowly effected with such efforts, prepared the soil on which civilisation was hereafter destined to flourish.

P. BROCA,

*Professeur à la Faculté de Médecine de Paris.*